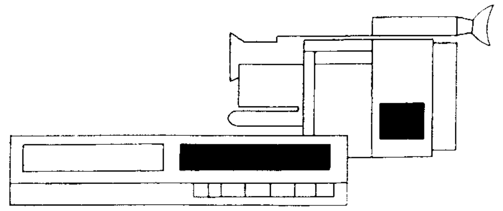
NOKIA
CONSUMER ELECTRONICS



VR

1990

NOKIA UNTERHALTUNGSELEKTRONIK GmbH
Service, Östliche 132, Postfach 1526
D-7530 Pforzheim

Service-Manual

ITT NOKIA

VR 3701, 3701 V, 3701 UK
VR 3701 VPS, 3701 H
VR 3721
VR 3721 VPS, 3721 UK

Luxor

VR 3701 LX
VR 3721 LX

(D) Elektrischer Abgleich

Schaltbilder, Leiterplatten, Ersatzteile-Liste und Mechanik-Justagen, siehe Rückseite

⚠ **Sicherheitsbauteil!**
Dieses Symbol kennzeichnet in den Schaltbildern alle Bauteile, die nur durch Originalteile ersetzt werden dürfen.

Bei Reparaturen gültige Sicherheitsvorschriften beachten!

(GB) Electrical alignment

Circuit diagrams, P.C.B., spare parts list and mechanical adjustments, see rear page

⚠ **Safety Component!**
This symbol identifies in the circuit diagrams all safety critical parts. Replace only with specified part numbers.

Service and repair work to be performed only in accordance with existing safety regulations!

(F) Alignement

Schémas, circuits imprimés, liste des pièces détachées et mécanique ajustages, voir page précédante

⚠ **Composant de protection!**
Ce symbol indique tous les composants dans les schémas, qui doivent être remplacés uniquement par des pièces d'origines.

Pendant le dépannage respecter les régulations du sécurité!

Änderungen vorbehalten
Modifications reserved
Modifications réservées

6611 77 05
(611) SA

Liste der Service-Manuale
Liste of Service Manuals
Liste des manuals

	Modell Model Modèle	Schaltbilder, Leiterplatten, Ersatzteile-Liste Circ. diagr., P.C.B.,spare parts list Schémas circ. imprimés, liste des pièces détachées No.	Elektrischer Abgleich Electrical alignment Alignement No.	Mechanik-Justagen Mechanical adjustments Mécanique ajustages No.
ITT NOKIA	VR 3701 VPS	6611 77 04	6611 77 05	6611 77 06
LUXOR	VR 3701 LX			
ITT NOKIA	VR 3701			
ITT NOKIA	VR 3721 VPS			
LUXOR	VR 3721 LX			
ITT NOKIA	VR 3721			
ITT NOKIA	VR 3701 UK	6611 77 07		
ITT NOKIA	VR 3701 V			
ITT NOKIA	VR 3721 UK			
ITT NOKIA	VR 3701 H	6611 77 08		
ITT NOKIA	VR 3731 VPS	6611 77 09	6611 77 10	
ITT NOKIA	VR 3731			
LUXOR	VR 3731 LX			
ITT NOKIA	VR 3731 UK	6611 77 11		
ITT NOKIA	VR 3761 HIFI VPS	6611 77 12	6611 77 13	
ITT NOKIA	VR 3761 HIFI NICAM	6611 77 14		
LUXOR	VR 3761 HIFI NICAM LX			
ITT NOKIA	VR 3761 HIFI UK	6611 77 15		
ITT NOKIA	VR 3781 HIFI VPS	6611 77 16	6611 77 17	
ITT NOKIA	VR 3781 HIFI NICAM	6611 77 18		
LUXOR	VR 3781 HIFI NICAM LX			
OCEANIC	VR 3721 S	6611 77 19	6611 77 20	
OCEANIC	VR 3701 S			
OCEANIC	VR 3741 MS	6611 77 21		
OCEANIC	VR 3751 MS	6611 77 22	6611 77 23	

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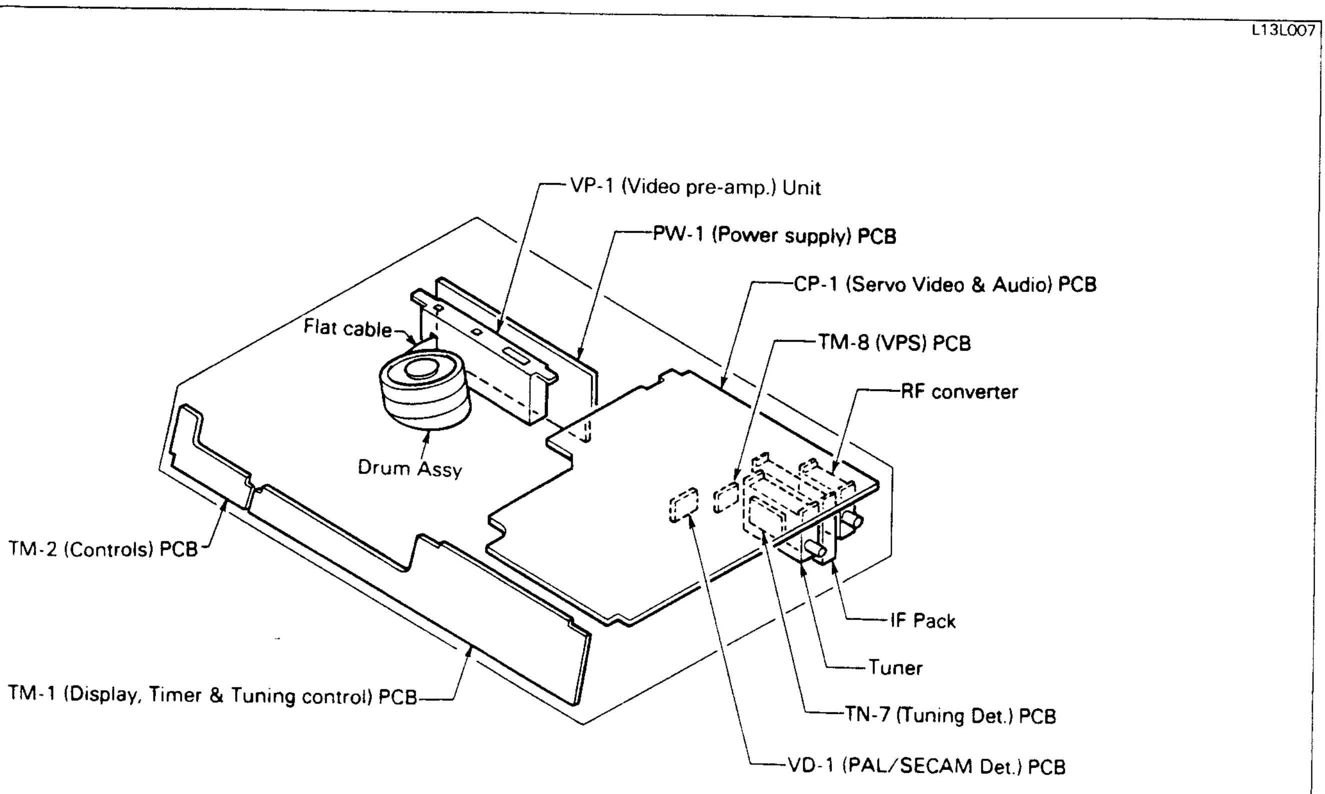
1. CIRCUIT BOARD LOCATIONS

1-1. MAIN BOARDS


L13L007
VP-1 (Video pre-amp.) Unit
PW-1 (Power supply) PCB
CP-1 (Servo Video & Audio) PCB
TM-8 (VPS) PCB
RF converter
Flat cable
Drum Assy
TM-2 (Controls) PCB
TM-1 (Display, Timer & Tuning control) PCB
IF Pack
Tuner
TN-7 (Tuning Det.) PCB
VD-1 (PAL/SECAM Det.) PCB

* VD-1 (PAL/SECAM Det.) PCB is not installed on VR 3701 V, 3701 UK and 3721 UK.
** TM-8 (VPS) PCB is installed on VR 3701 VPS, VR 3721 VPS and optional on VR 3701 H.

Fig. 1-1

1-2. LOCATION FOR TAPE PATH ADJUSTMENT

NOTE: Test point TP182 and TP183 for tape path adjustment is shown in figure below.
For adjustment, refer to the separate volume "Mechanism Service Technical Information".

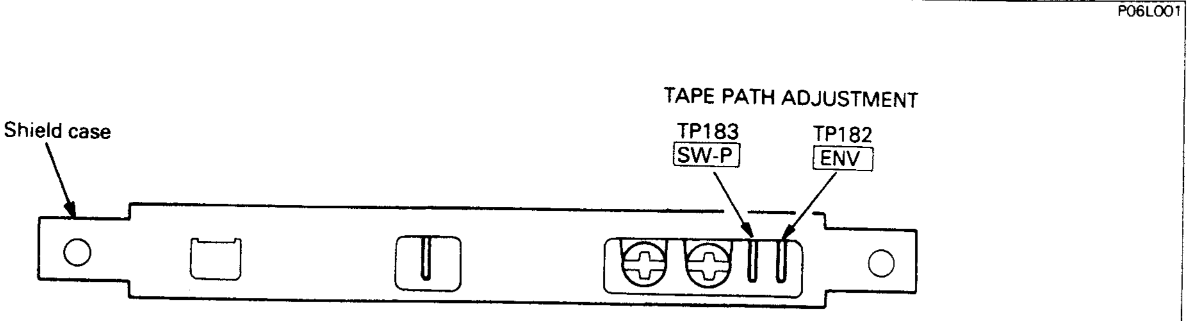

P06L001
TAPE PATH ADJUSTMENT
Shield case
TP183
SW-P
TP182
ENV

Fig. 1-2 Pre-amp Unit

2. ELECTRICAL ADJUSTMENT

2-1. PREPARATION

2-1-1. EQUIPMENT

- Colour TV monitor
- PAL Colour-bar generator (with RF and LINE OUTPUT)
- Audio signal generator
- Oscilloscope (dual trace; frequency response: 10MHz or more; probe: 10:1)
- Frequency counter (countable to 10MHz or higher)
- Digital voltmeter
- AC voltmeter
- In/output probes
- Alignment cassette (VHJ-0008) PAL Colour bar 1KHz
- Alignment cassette (VHJ-0009) Monoscope 6KHz
- Alignment cassette (VHJ-0051) Check for D.O.C.
- Alignment cassette (VHJ-0023) PAL Monoscope 6KHz, PAL Colour-bar 1KHz, SECAM Colour-bar 1KHz, PAL RF Sweep MESECAM Colour-bar 1KHz, NTSC Colour-bar 1KHz.
- Relay jig (VHJ-0065) 5-wire cable for Pre-amp unit
  Connect the Flat cable end from the Drum assembly to the Pre-amp unit using the Relay jig to provide simple repairing and adjustment of the Pre-amp unit, as shown in Fig. 2-1-1. Further, when adjusting the Pre-amp unit, be sure to make contact an end of Shield case with Bracket of the Pre-amp unit to maintain the shield effect.
- Extension relay jig (VHJ-0079) for CP-1 PCB
  Connect between the CP-1 and TM-1 PCB using the Extension relay jig to provide simple repairing and adjustment of the CP-1 PCB, as shown in Fig. 2-1-2. Correctly, connect the Connector from CN304 on the CP-1 PCB to CN005 of the Relay jig, and that from CN001 of the Relay jig to CN711 of the TM-1 PCB. The connector from CN002 of the Relay jig is not required connect.

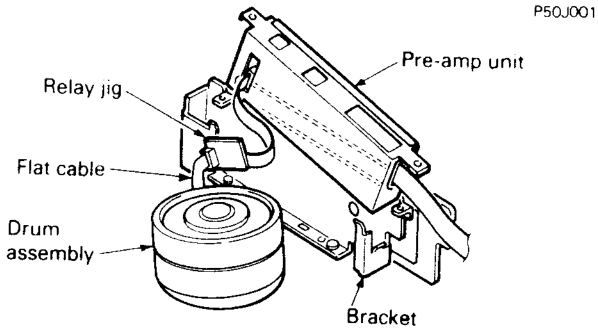

P50J001
Relay jig
Pre-amp unit
Flat cable
Drum assembly
Bracket

Fig. 2-1-1

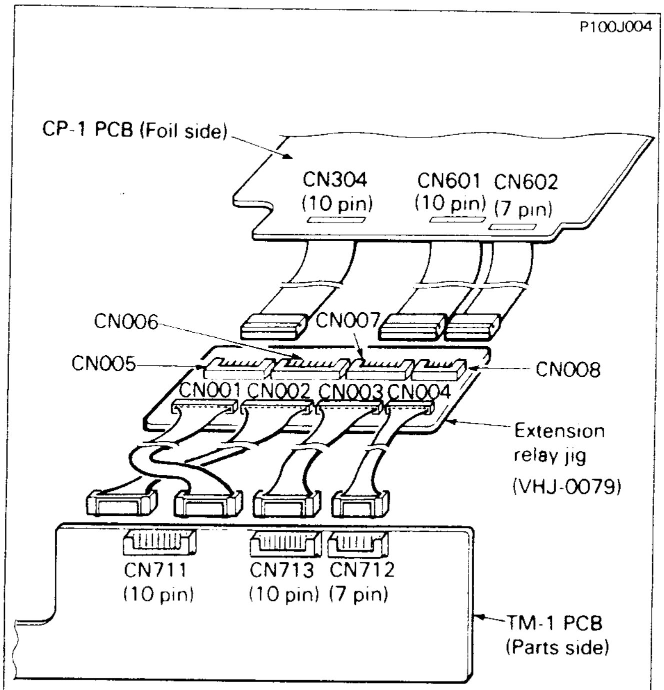

P100J004
CP-1 PCB (Foil side)
CN304 (10 pin)
CN601 (10 pin)
CN602 (7 pin)
CN006
CN007
CN005
CN008
CN001 CN002 CN003 CN004
Extension relay jig (VHJ-0079)
CN711 (10 pin)
CN713 (10 pin)
CN712 (7 pin)
TM-1 PCB (Parts side)

Fig. 2-1-2

2-1-2. SET-UP

Because the RF input signal is used for circuit adjustments, connect the colour-bar generator to the ANT IN terminal of the VCR. The RF input signal is processed by the tuner and IF circuit. It is important that the video output signal of the IF circuit satisfies the items shown in Fig. 2-1-3. Connect the oscilloscope to the VIDEO OUTPUT terminal of the video circuit and terminal with a 75Ω load, and then check the video output signal.

- The amplitude of the sync signal should be approximately 0.3 Vp-p.
- The amplitude of the video signal should be approximately 0.7 Vp-p.
- While observing the oscilloscope or TV screen, make fine-tuning adjustments so that the colour burst amplitude is approximately 0.3 Vp-p.
- Check to be sure that there is no spike noise in the sync part of the horizontal sync signal.

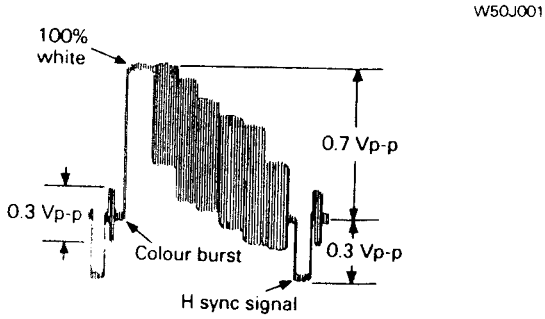
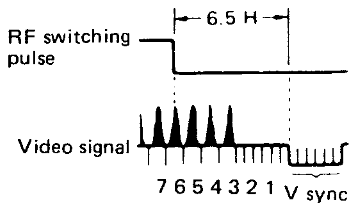


Fig. 2-1-3

2-2. SERVO CIRCUIT ADJUSTMENT ..... CP-1 PCB

NOTE (1) : These adjustments should be carried out upon completion of the transport adjustments.
(2) : If the tape transport adjustments are carried out after these adjustments, follow the procedures again in SWITCHING POSITIONS.

No.	Item	Input	Mode	Point	Location	Remark
1	SWITCHING POSITION	Alignment cassette (VHJ-0009 or VHJ-0023)	PLAY	VIDEO OUTPUT TP101 RF SW pulse TP351	VR351	W25S002  6.5 H RF switching pulse Video signal 7 6 5 4 3 2 1 V sync 1. Press the tracking control (+) (–) buttons simultaneously to the center position (on the display "T —:— "). 2. Adjust VR351 so that the phase of the leading edge of the vertical sync signal is delayed 6.5 ± 0.5 H from the fall of the RF switching pulse waveform.
2	STILL V-LOCK	Colour bar from Colour bar generator	REC ↓ PLAY ↓ STILL	TV screen	VR361 Rear panel	1. Put the VCR in the REC mode and record at the middle of the cassette tape. 2. Playback the recorded part, and put the VCR in the STILL mode. 3. Adjust VR361 so that the V jitter (very fine movement of the vertical sync) is minimized.

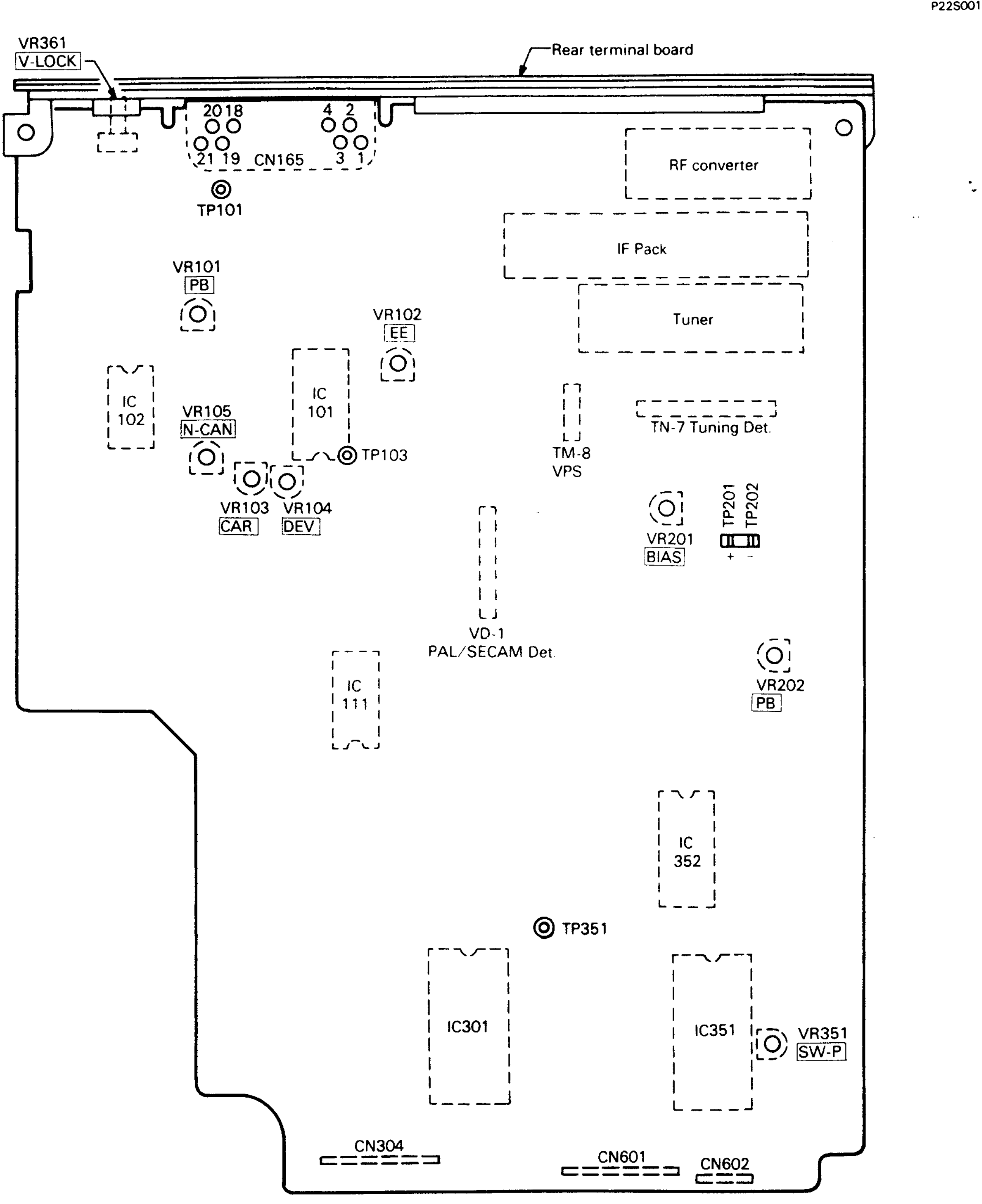

P22S001
VR361
V-LOCK
Rear terminal board
20 18
4 2
21 19
CN165
3 1
TP101
RF converter
IF Pack
Tuner
VR101
PB
VR102
EE
IC 102
VR105
N-CAN
IC 101
TP103
TM-8
VPS
TN-7 Tuning Det.
VR103
CAR
VR104
DEV
TP201
TP202
VR201
BIAS
+ -
VD-1
PAL/SECAM Det.
IC 111
VR202
PB
IC 352
TP351
IC301
IC351
VR351
SW-P
CN304
CN601
CN602

Fig. 2-2-1 CP-1 PCB (Foil side view)

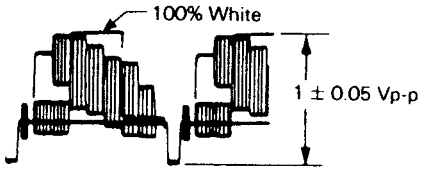
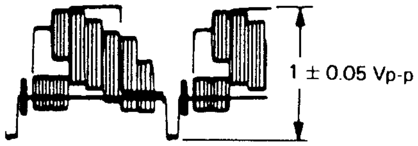
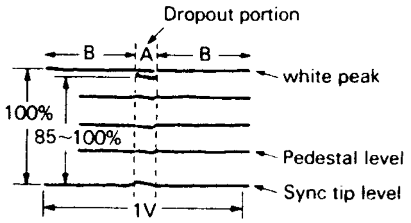
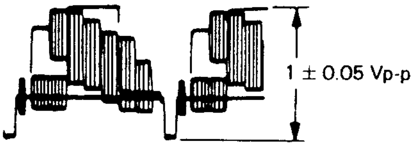
2-3. VIDEO CIRCUIT ADJUSTMENT ... CP-1 PCB and VP-1 Assy

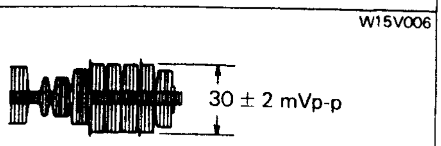
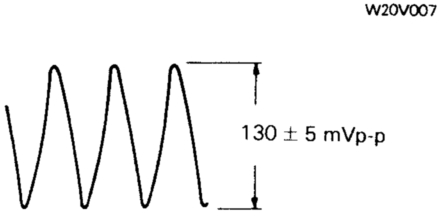
NOTE (1) : When adjustment No. 1, No. 2 and No. 5 below, terminate VIDEO OUTPUT TP101 at 75 ohms.

(2) : Adjustment No. 3 below, should be performed after stabilizing the circuit operation. (At least 5 minutes after VCR power on.)

(3) : 'No-signal REC mode' is not to supply any signal to VIDEO INPUT terminal.

(4) : Use the Relay jig mentiond in the 2-1. PREPARATION to provide easy adjustment of the Pre-amp unit.

No.	Item	Input	Mode	Point	Location	Remark
1	E-E LEVEL	Colour bar (100% white level) from Colour bar generator	E-E	VIDEO OUTPUT TP101 (CP-1 PCB)	VR102	W25V001  1. Adjust VR102 so that the level is 1.00 ± 0.05 Vp-p.
2	PB-Y LEVEL	Alignment cassette (VHJ-0008 or VHJ-0023)	PLAY	VIDEO OUTPUT TP101 (CP-1 PCB)	VR101	W20V003  1. Adjust VR101 so that the level is 1.00 ± 0.05 Vp-p.
3	N-CAN LEVEL	Alignment cassette (VHJ-0051)	PLAY	VIDEO OUTPUT TP101 (CP-1 PCB)	VR105	W30V005  Dropout portion B A B white peak 100% 85~100% Pedestal level Sync tip level 1V 1. Set the horizontal scale (TIME/DIV) of the oscilloscope to 1 msec./div.. 2. Adjust VR105 so that the white peak level at drop out portion "A" becomes 85 ~ 100% for the white peak level of no drop out portion "B".
4	CARRIER SET	No-signal	REC	TP103 (CP-1 PCB)	VR103	1. Set the channel selector buttons to the AV position and put the VCR in the no-signal REC mode. 2. Adjust VR103 so that the frequency is 3.80 ± 0.05 MHz.
5	DEVIATION	Colour bar (100% white level) from Colour bar generator	REC (Adjust-ment) ↓ PLAY (Check)	VIDEO OUTPUT TP101 (CP-1 PCB)	VR104	W20V003  1. Insert the blank tape to the VCR and record colour bar signal. 2. Playback the recorded part, and check that the level is 1.00 ± 0.05 Vp-p. 3. Repeat adjust VR104 before the record, and the playback it, if not satisfactory.

No.	Item	Input	Mode	Point	Location	Remark
6	C REC CURRENT	Colour bar from Colour bar generator	REC	TP181 (HOT) shield case (GND) (Pre-amp unit)	VR181	 W15V006 30 ± 2 mVp-p 1. Rotate VR182 so that the luminance level is minimize. 2. Adjust VR181 so that the level is 30 ± 2 mVp-p.
7	Y REC CURRENT	No-signal	REC	TP181 (HOT) shield case (GND) (Pre-amp unit)	VR182	 W20V007 130 ± 5 mVp-p 1. Set the channel selector buttons to AV position and put the VCR in the no-signal REC mode. 2. Adjust VR182 so that the level is 130 ± 5 mVp-p.

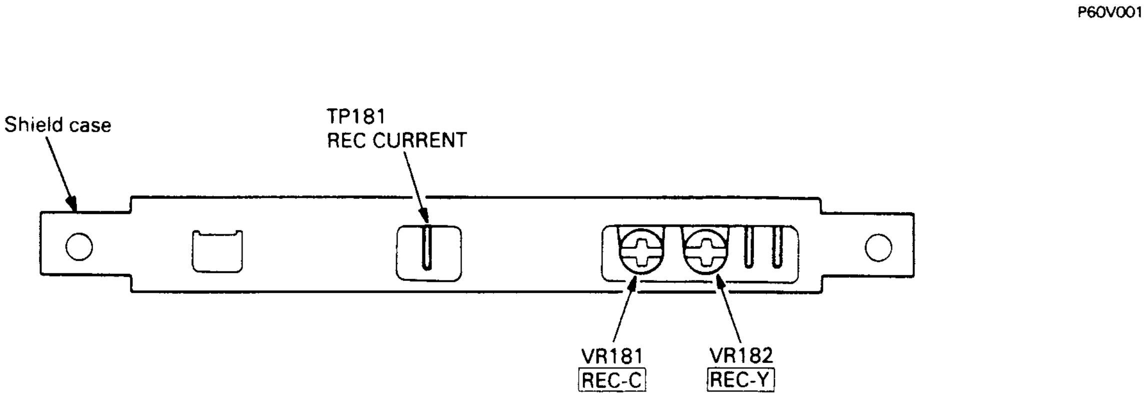

P60V001
Shield case
TP181
REC CURRENT
VR181
REC-C
VR182
REC-Y

Fig. 2-3-1 Pre-amp Unit

2-4. AUDIO CIRCUIT ADJUSTMENT ... CP-1 PCB

NOTE: 'No-signal record mode' is not to supply any signal to AUDIO INPUT terminal.

No.	Item	Input	Mode	Point	Location	Remark
1	BIAS LEVEL	No-signal	REC	TP201 TP202 (GND)	VR201	1. Set the channel selector buttons to the AV position and put the VCR in the no-signal REC mode. 2. Adjust VR201 so that the level is 20 mVrms.
2	REC/PB OUTPUT LEVEL	Audio signal (1 KHz, -3.8 dBm) from Audio signal generator	REC ↓ PLAY	AUDIO OUTPUT CN165 pin 1	VR202	1. Adjust VR202 so that the recorded 1 KHz output level becomes -3.8 dBm in the PLAY mode.

2-5. TUNER IF CIRCUIT ADJUSTMENT ... IF Pack

NOTE: When performing the adjustment for the type B model, be sure to remove the rear terminal board for CP-1 PCB (see Fig. 2-2-1 on page 5).

No.	Item	Input	Mode	Point	Location	Remark
1	RF AGC	TV broadcast	E-E	TV screen	VR611	1. Turn VR611 in the direction which causes snow to appear, then in the opposite direction until the snow just disappears.

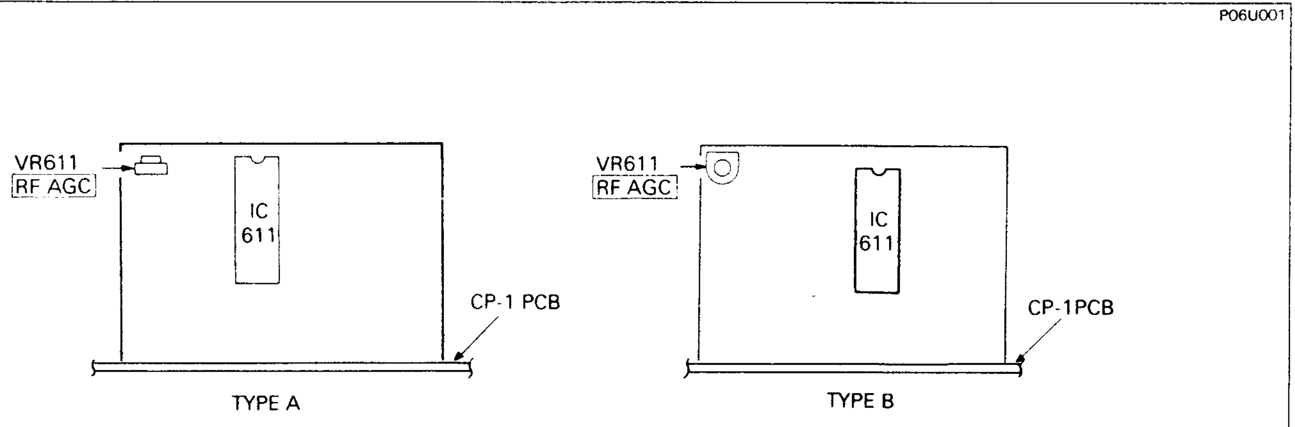


Fig. 2-5-1 IF Pack (Parts side view)

ITT NOKIA

VR 3701
VR 3701 VPS
VR 3721
VR 3721 VPS

LUXOR

VR 3701 LX
VR 3721 LX

BLOCK DIAGRAMS, CIRCUIT DIAGRAMS & PRINTED CIRCUIT BOARDS

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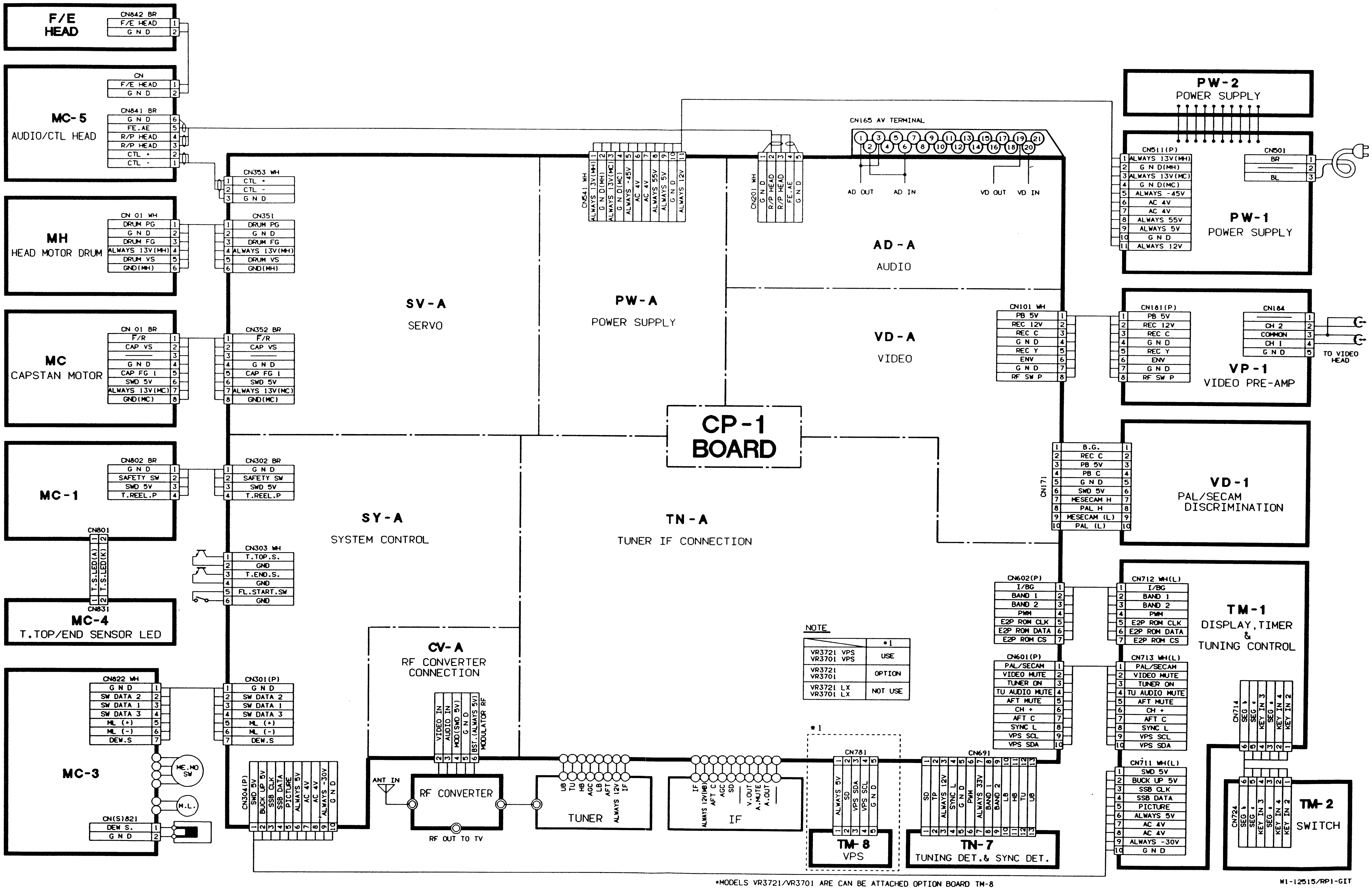
2-33. IR REMOTE CONTROL CIRCUIT DIAGRAM .... 49~50

6611 77 04
(611) SA

1. BLOCK DIAGRAM

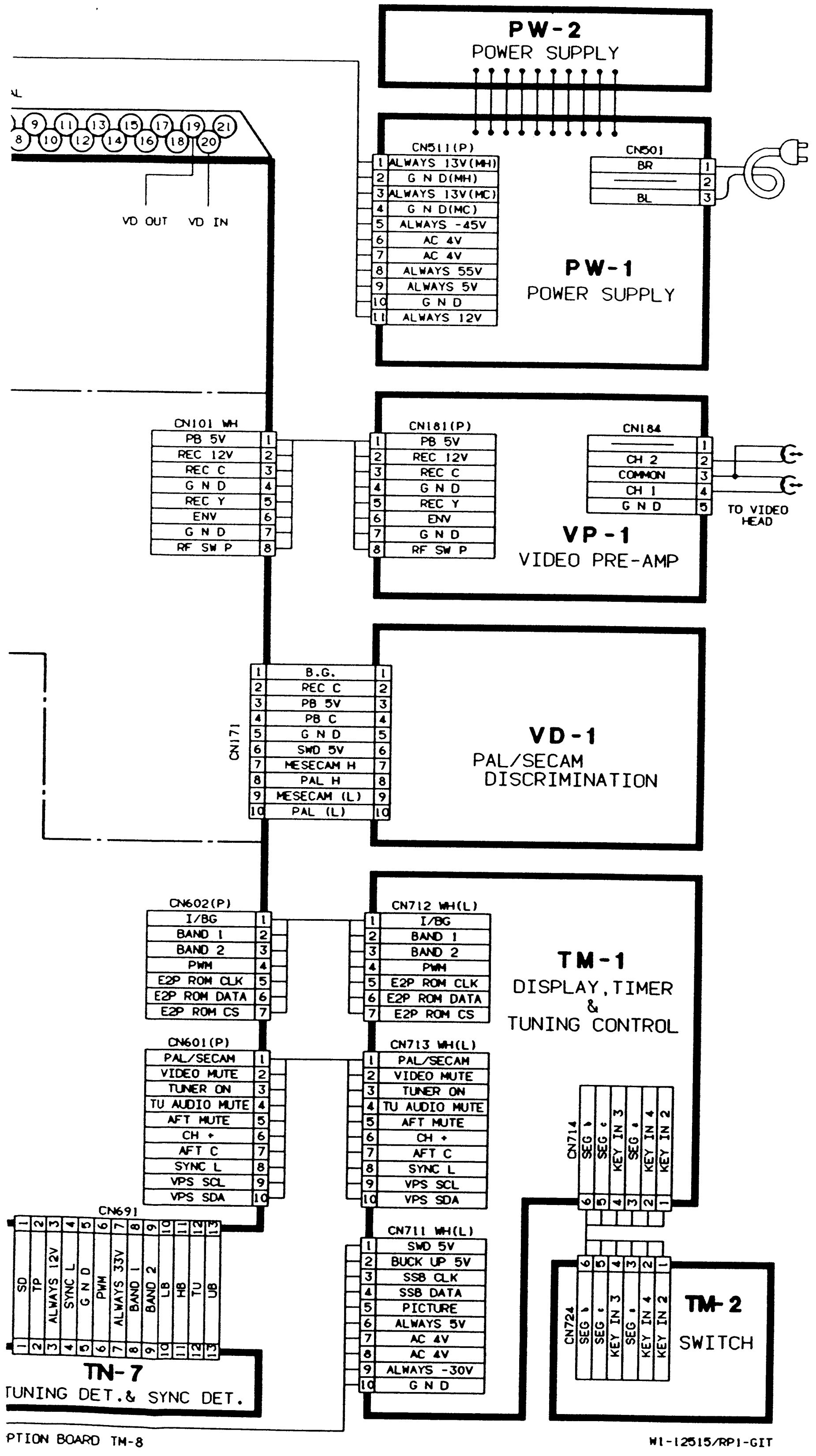
1-1. OVERALL WIRING DIAGRAM


F/E HEAD
CN842 BR
F/E HEAD
G N D
MC-5
AUDIO/CTL HEAD
CN841 BR
G N D
FE.AE
R/P HEAD
R/P HEAD
CTL +
CTL -
MH
HEAD MOTOR DRUM
CN 01 WH
DRUM PG
G N D
DRUM FG
ALWAYS 13V(MH)
DRUM VS
GND(MH)
MC
CAPSTAN MOTOR
CN 01 BR
F/R
CAP VS
G N D
CAP FG 1
SWD 5V
ALWAYS 13V(MC)
GND(MC)
MC-1
CN802 BR
SAFETY SW
T.REEL.P
CN801
T.S.LED(A)
T.S.LED(K)
CN831
MC-4
T.TOP/END SENSOR LED
MC-3
CN822 WH
SW DATA 2
SW DATA 1
SW DATA 3
ML (+)
ML (-)
DEW.S
ME.MO SW
M.L.
CN(S)821
DEW S.
CN353 WH
CN351
CN352 BR
CN302 BR
CN303 WH
T.TOP.S.
GND
T.END.S.
FL.START.SW
CN301(P)
CN304(P)
BUCK UP 5V
SSB CLK
SSB DATA
PICTURE
ALWAYS 5V
AC 4V
ALWAYS -30V
SV-A
SERVO
PW-A
POWER SUPPLY
SY-A
SYSTEM CONTROL
TN-A
TUNER IF CONNECTION
AD-A
AUDIO
VD-A
VIDEO
CP-1
BOARD
CV-A
RF CONVERTER
CONNECTION
VIDEO IN
AUDIO IN
MOD(SWD 5V)
BST.(ALWAYS 5V)
MODULATOR RF
ANT IN
RF CONVERTER
RF OUT TO TV
TUNER
UB
TU
HB
AGC
LB
AFT
ALWAYS 12V
IF
ALWAYS 12V(HB)
AFT C
SD
V.OUT
A.MUTE
A.OUT
CN541 WH
ALWAYS 13V(MH)
G N D(MH)
ALWAYS 13V(MC)
G N D(MC)
ALWAYS -45V
AC 4V
ALWAYS 55V
ALWAYS 5V
ALWAYS 12V
CN201 WH
R/P HEAD
FE.AE
CN165 AV TERMINAL
AD OUT
AD IN
VD OUT
VD IN
PW-2
POWER SUPPLY
PW-1
POWER SUPPLY
CN511(P)
CN501
BR
BL
CN101 WH
PB 5V
REC 12V
REC C
REC Y
ENV
RF SW P
CN181(P)
CN184
CH 2
COMMON
CH 1
TO VIDEO HEAD
VP-1
VIDEO PRE-AMP
CN171
B.G.
PB C
MESECAM H
PAL H
MESECAM (L)
PAL (L)
VD-1
PAL/SECAM
DISCRIMINATION
CN602(P)
CN712 WH(L)
I/BG
BAND 1
BAND 2
PWM
E2P ROM CLK
E2P ROM DATA
E2P ROM CS
TM-1
DISPLAY, TIMER
&
TUNING CONTROL
CN601(P)
CN713 WH(L)
PAL/SECAM
VIDEO MUTE
TUNER ON
TU AUDIO MUTE
AFT MUTE
CH +
AFT C
SYNC L
VPS SCL
VPS SDA
CN711 WH(L)
CN714
SEG +
SEG -
KEY IN 3
KEY IN 4
KEY IN 2
CN724
TM-2
SWITCH
*1
CN781
TM-8
VPS
CN691
TP
PWM
ALWAYS 33V
TN-7
TUNING DET.& SYNC DET.
W1-12515/RP1-GIT

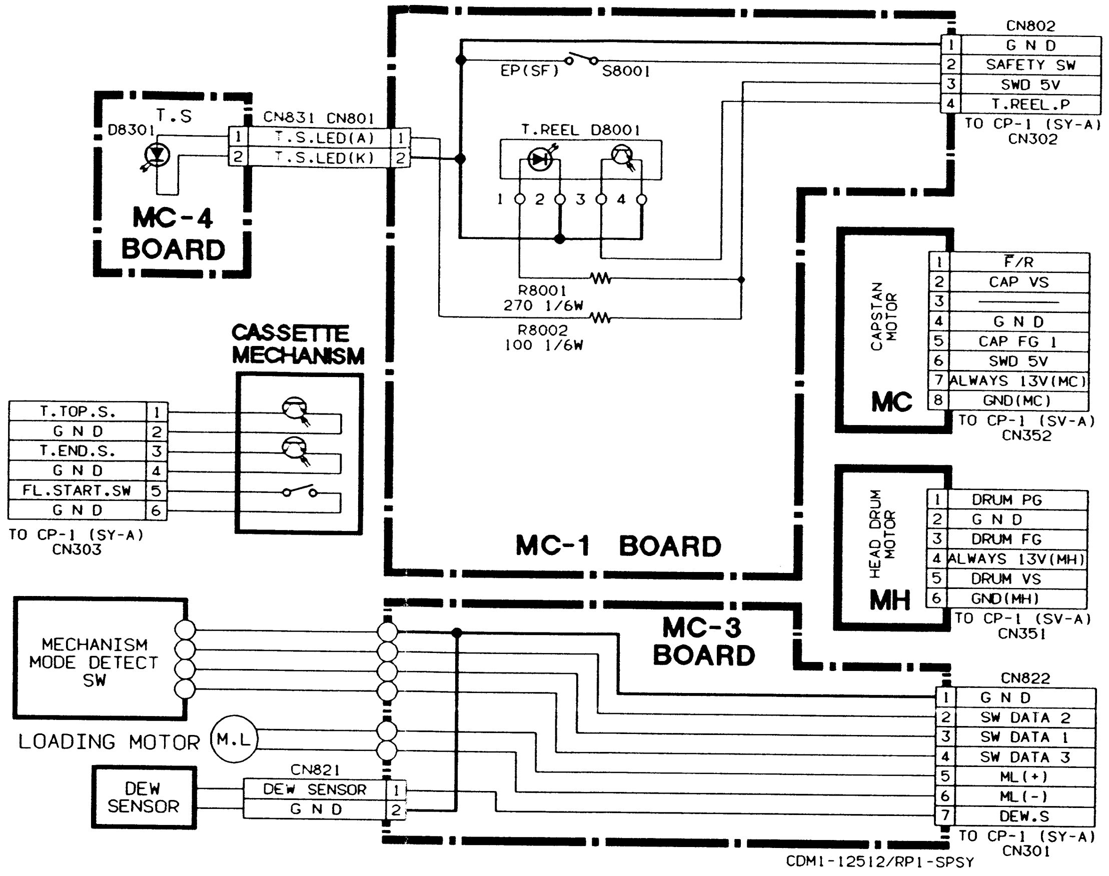
NOTE

	*1
VR3721 VPS VR3701 VPS	USE
VR3721 VR3701	OPTION
VR3721 LX VR3701 LX	NOT USE

*MODELS VR3721/VR3701 ARE CAN BE ATTACHED OPTION BOARD TM-8

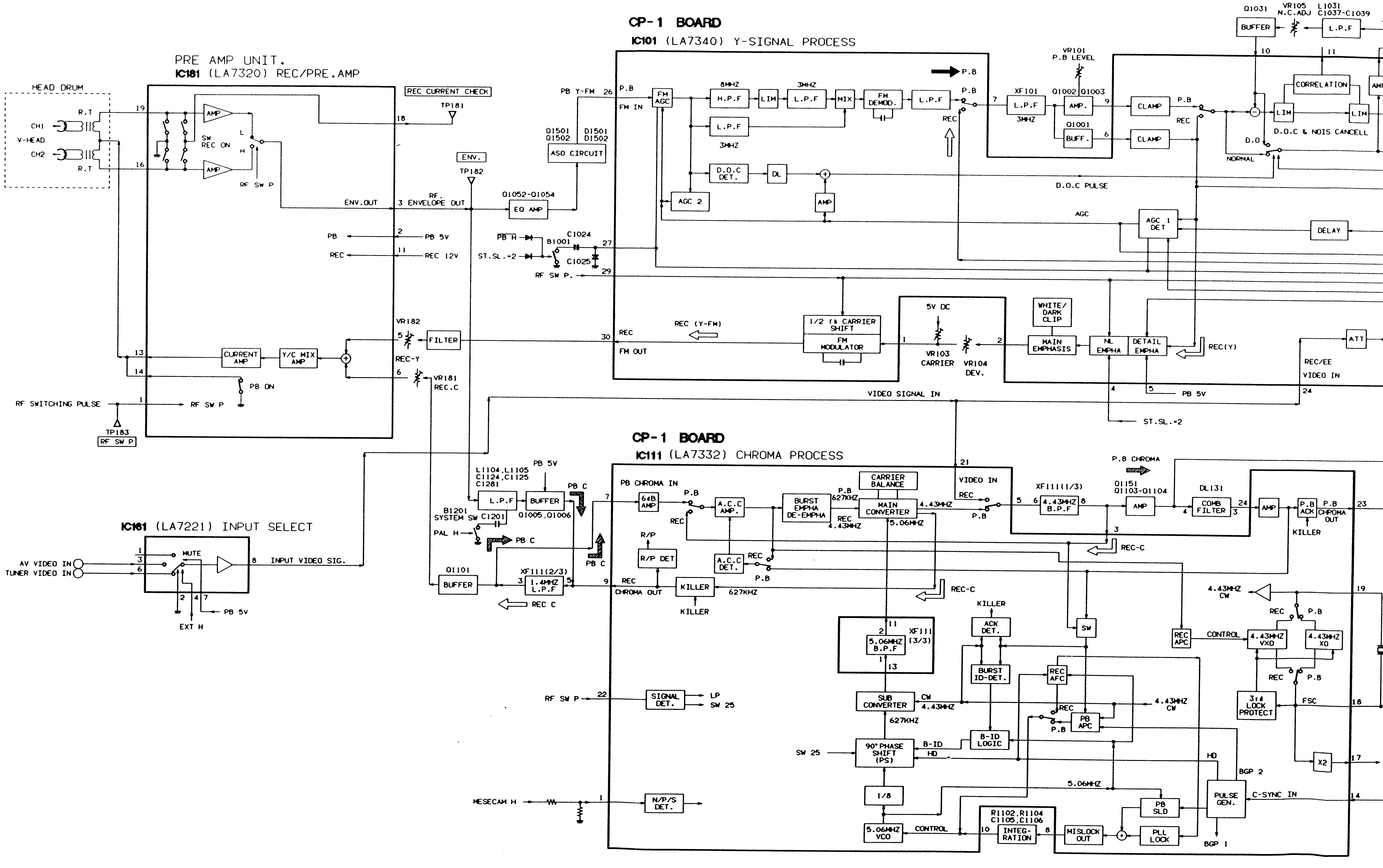

PW-2
POWER SUPPLY
PW-1
POWER SUPPLY
CN511(P)
1 ALWAYS 13V(MH)
2 G N D(MH)
3 ALWAYS 13V(MC)
4 G N D(MC)
5 ALWAYS -45V
6 AC 4V
7 AC 4V
8 ALWAYS 55V
9 ALWAYS 5V
10 G N D
11 ALWAYS 12V
CN501
BR
BL
VD OUT
VD IN
CN101 WH
1 PB 5V
2 REC 12V
3 REC C
4 G N D
5 REC Y
6 ENV
7 G N D
8 RF SW P
CN181(P)
1 PB 5V
2 REC 12V
3 REC C
4 G N D
5 REC Y
6 ENV
7 G N D
8 RF SW P
CN184
1
2 CH 2
3 COMMON
4 CH 1
5 G N D
TO VIDEO HEAD
VP-1
VIDEO PRE-AMP
CN171
1 B.G.
2 REC C
3 PB 5V
4 PB C
5 G N D
6 SWD 5V
7 MESECAM H
8 PAL H
9 MESECAM (L)
10 PAL (L)
VD-1
PAL/SECAM DISCRIMINATION
CN602(P)
1 I/BG
2 BAND 1
3 BAND 2
4 PWM
5 E2P ROM CLK
6 E2P ROM DATA
7 E2P ROM CS
CN712 WH(L)
1 I/BG
2 BAND 1
3 BAND 2
4 PWM
5 E2P ROM CLK
6 E2P ROM DATA
7 E2P ROM CS
TM-1
DISPLAY,TIMER & TUNING CONTROL
CN601(P)
1 PAL/SECAM
2 VIDEO MUTE
3 TUNER ON
4 TU AUDIO MUTE
5 AFT MUTE
6 CH +
7 AFT C
8 SYNC L
9 VPS SCL
10 VPS SDA
CN713 WH(L)
1 PAL/SECAM
2 VIDEO MUTE
3 TUNER ON
4 TU AUDIO MUTE
5 AFT MUTE
6 CH +
7 AFT C
8 SYNC L
9 VPS SCL
10 VPS SDA
CN714
6 SEG ↓
5 SEG ←
4 KEY IN 3
3 SEG →
2 KEY IN 4
1 KEY IN 2
CN711 WH(L)
1 SWD 5V
2 BUCK UP 5V
3 SSB CLK
4 SSB DATA
5 PICTURE
6 ALWAYS 5V
7 AC 4V
8 AC 4V
9 ALWAYS -30V
10 G N D
CN724
6 SEG ↓
5 SEG ←
4 KEY IN 3
3 SEG →
2 KEY IN 4
1 KEY IN 2
TM-2
SWITCH
CN691
1 SD
2 TP
3 ALWAYS 12V
4 SYNC L
5 G N D
6 PWM
7 ALWAYS 33V
8 BAND 1
9 BAND 2
10 LB
11 HB
12 TU
13 UB
TN-7
TUNING DET.& SYNC DET.
PTION BOARD TN-8
W1-12515/RP1-GIT

1-2. MECHANISM CONNECTION CIRCUIT DIAGRAM

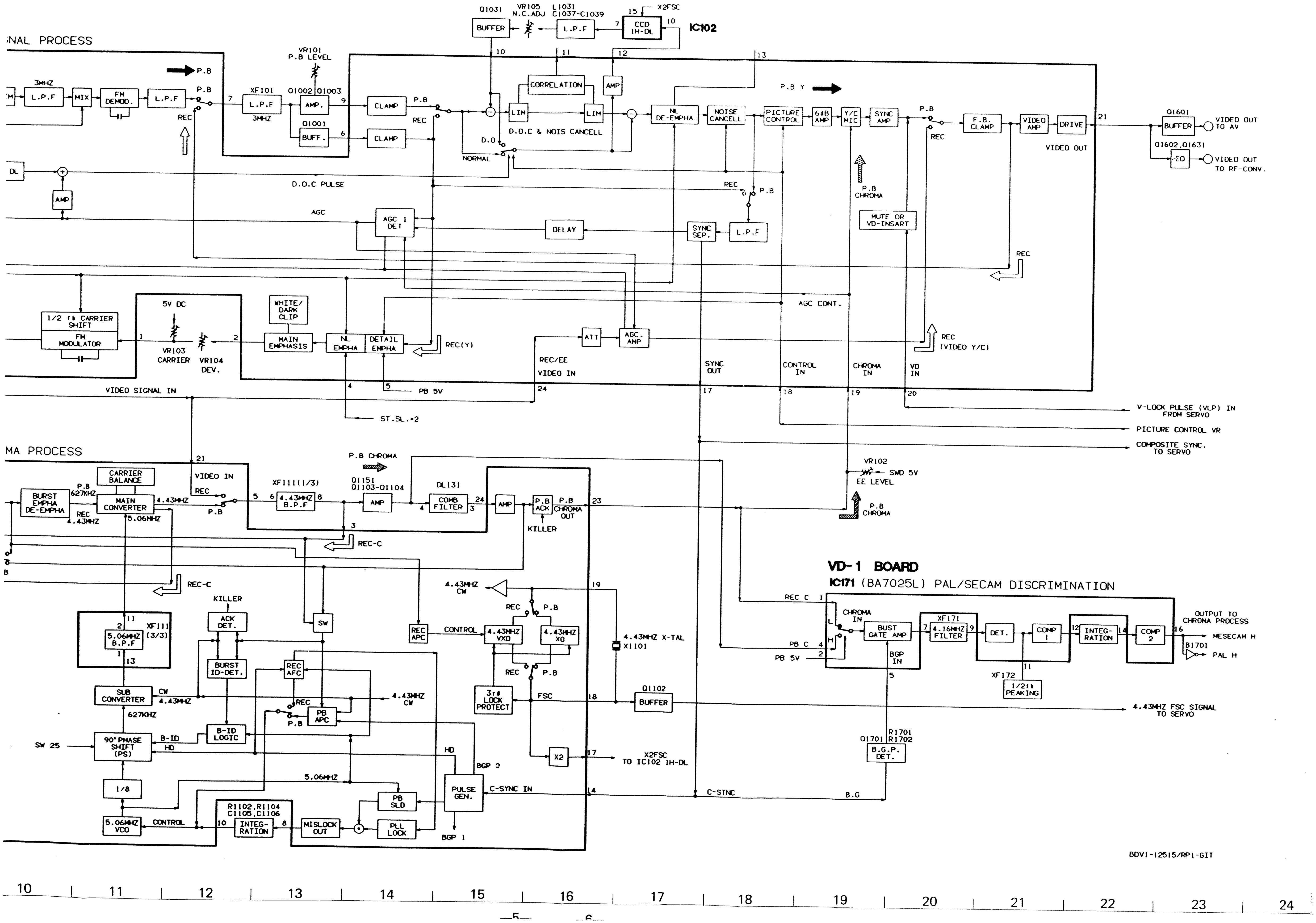

MC-4 BOARD
T.S
D8301
CN831 CN801
1 T.S.LED(A)
2 T.S.LED(K)
EP(SF)
S8001
T.REEL D8001
1 2 3 4
R8001
270 1/6W
R8002
100 1/6W
CN802
1 G N D
2 SAFETY SW
3 SWD 5V
4 T.REEL.P
TO CP-1 (SY-A) CN302
CASSETTE MECHANISM
1 T.TOP.S.
2 G N D
3 T.END.S.
4 G N D
5 FL.START.SW
6 G N D
TO CP-1 (SY-A) CN303
MC-1 BOARD
CAPSTAN MOTOR
MC
1 F/R
2 CAP VS
3
4 G N D
5 CAP FG 1
6 SWD 5V
7 ALWAYS 13V(MC)
8 GND(MC)
TO CP-1 (SV-A) CN352
HEAD DRUM MOTOR
MH
1 DRUM PG
2 G N D
3 DRUM FG
4 ALWAYS 13V(MH)
5 DRUM VS
6 GND(MH)
TO CP-1 (SV-A) CN351
MECHANISM MODE DETECT SW
LOADING MOTOR
M.L
MC-3 BOARD
CN822
1 G N D
2 SW DATA 2
3 SW DATA 1
4 SW DATA 3
5 ML(+)
6 ML(-)
7 DEW.S
TO CP-1 (SY-A) CN301
DEW SENSOR
CN821
1 DEW SENSOR
2 G N D
CDM1-12512/RP1-SPSY

11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23

1-3. VIDEO CIRCUIT BASIC BLOCK DIAGRAM

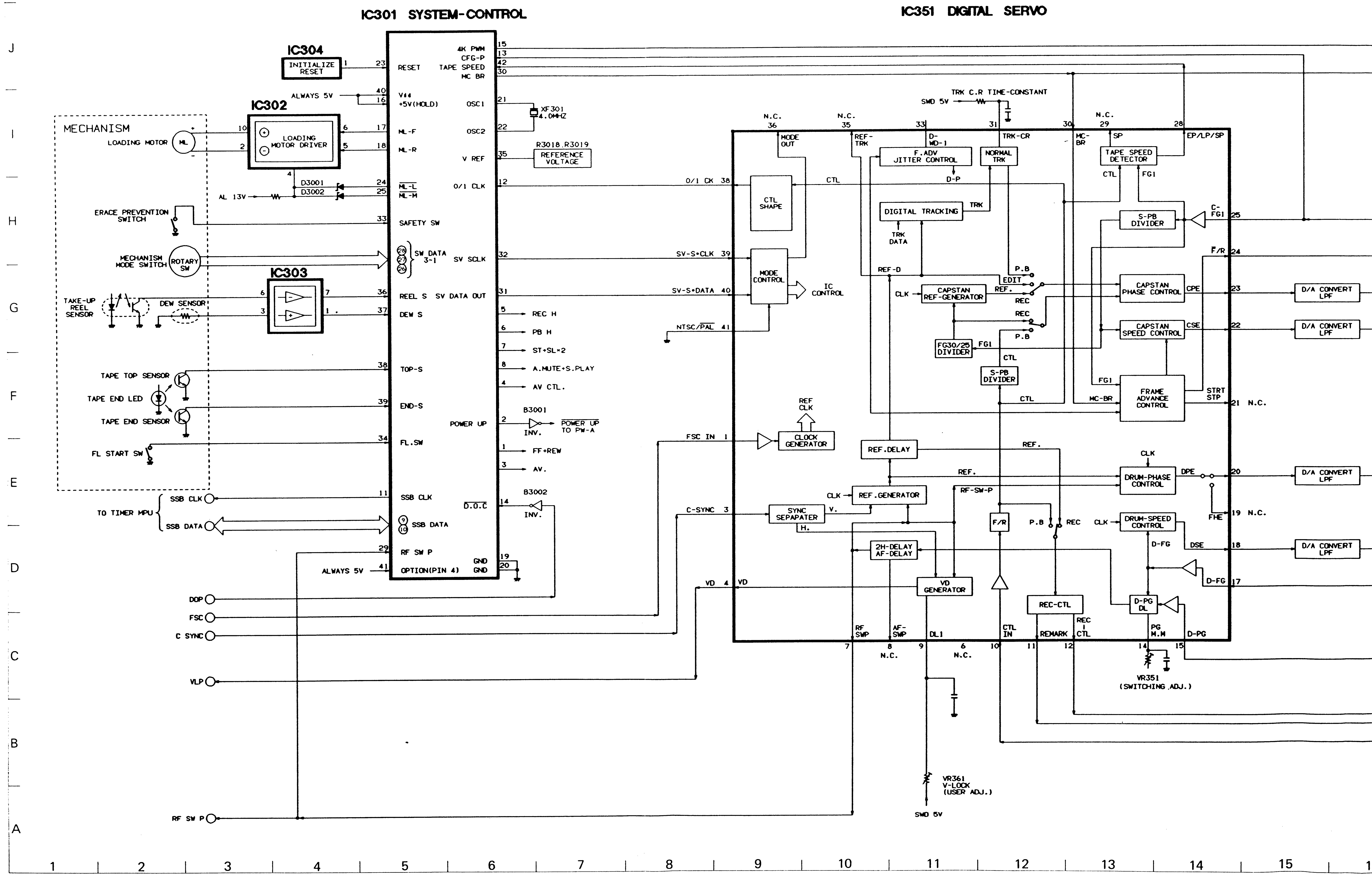

CP-1 BOARD
IC101 (LA7340) Y-SIGNAL PROCESS
PRE AMP UNIT.
IC181 (LA7320) REC/PRE.AMP
HEAD DRUM
CH1
V-HEAD
CH2
R.T
AMP
SW REC ON
L
H
RF SW P
REC CURRENT CHECK
TP181
ENV.
TP182
ENV.OUT
RF. 3 ENVELOPE OUT
PB
PB 5V
REC
REC 12V
VR182
REC-Y
VR181
REC.C
FILTER
CURRENT AMP
Y/C MIX AMP
PB ON
RF SWITCHING PULSE
RF SW P
TP183
Q1501 Q1502
D1501 D1502
ASD CIRCUIT
Q1052-Q1054
EQ AMP
PB Y-FM
P.B
FM IN
FM AGC
8MHZ
H.P.F
LIM
3MHZ
L.P.F
MIX
FM DEMOD.
D.O.C DET.
DL
AGC 2
D.O.C PULSE
AGC
AGC 1 DET
DELAY
PB H
ST.SL.×2
B1001
C1024
C1025
RF SW P.
REC (Y-FM)
FM OUT
1/2 fh CARRIER SHIFT
FM MODULATOR
5V DC
VR103 CARRIER
VR104 DEV.
WHITE/DARK CLIP
MAIN EMPHASIS
NL EMPHA
DETAIL EMPHA
REC(Y)
ATT
REC/EE
VIDEO IN
VIDEO SIGNAL IN
PB 5V
ST.SL.×2
XF101
3MHZ
VR101 P.B LEVEL
Q1002 Q1003
Q1001
BUFF.
CLAMP
D.O
NORMAL
LIM
D.O.C & NOIS CANCELL
CORRELATION
Q1031
VR105 N.C.ADJ
L1031 C1037-C1039
BUFFER
CP-1 BOARD
IC111 (LA7332) CHROMA PROCESS
IC161 (LA7221) INPUT SELECT
AV VIDEO IN
TUNER VIDEO IN
MUTE
INPUT VIDEO SIG.
EXT H
PB 5V
L1104,L1105 C1124,C1125 C1281
Q1005,Q1006
B1201 SYSTEM SW
C1201
PAL H
PB C
Q1101
BUFFER
XF111(2/3)
1.4MHZ L.P.F
REC C
PB CHROMA IN
6dB AMP
A.C.C AMP.
BURST EMPHA DE-EMPHA
627KHZ
CARRIER BALANCE
MAIN CONVERTER
4.43MHZ
5.06MHZ
R/P
R/P DET
A.C.C DET.
CHROMA OUT
KILLER
REC-C
VIDEO IN
P.B CHROMA
XF111(1/3)
4.43MHZ B.P.F
Q1151 Q1103-Q1104
DL131
COMB FILTER
P.B ACK
P.B CHROMA OUT
XF111 (3/3)
5.06MHZ B.P.F
ACK DET.
BURST ID-DET.
REC AFC
SW
REC APC
CONTROL
4.43MHZ VXO
4.43MHZ XO
4.43MHZ CW
3rd LOCK PROTECT
FSC
X2
SIGNAL DET.
LP
SW 25
SUB CONVERTER
CW
90° PHASE SHIFT (PS)
B-ID
HD
B-ID LOGIC
PB APC
1/8
5.06MHZ VCO
R1102,R1104 C1105,C1106
INTEG-RATION
MISLOCK OUT
PB SLD
PLL LOCK
PULSE GEN.
BGP 2
BGP 1
C-SYNC IN
MESECAM H
N/P/S DET.
K J I H G F E D C B A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1-3. VIDEO CIRCUIT BASIC BLOCK DIAGRAM

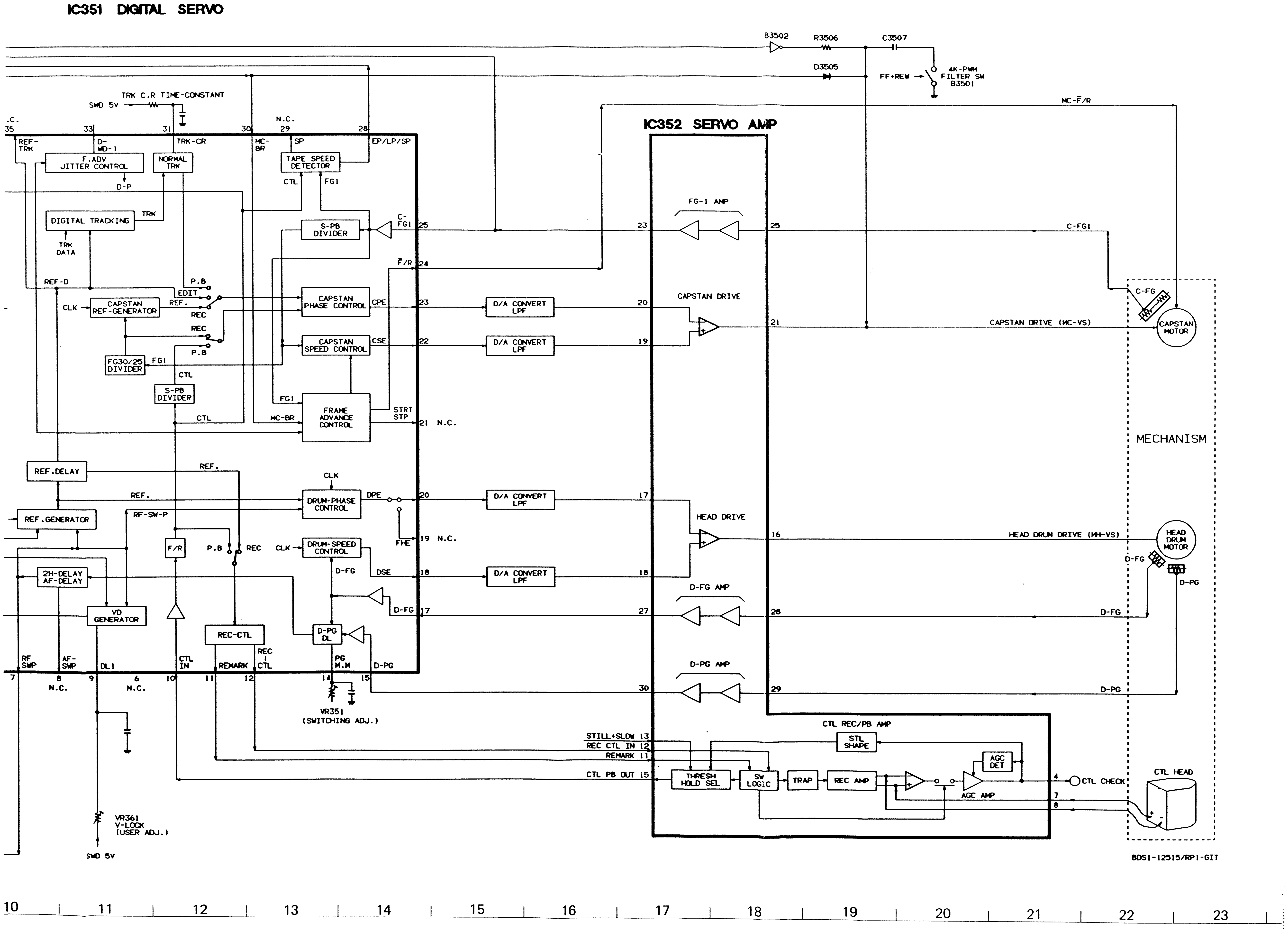


NAL PROCESS
MA PROCESS
Q1031
BUFFER
VR105
N.C.ADJ
L1031
C1037~C1039
L.P.F
CCD
1H-DL
X2FSC
IC102
VR101
P.B LEVEL
3MHZ
L.P.F
MIX
FM DEMOD.
P.B
REC
XF101
L.P.F
3MHZ
Q1002 Q1003
AMP.
Q1001
BUFF.
CLAMP
CLAMP
CORRELATION
AMP
LIM
LIM
D.O.C & NOIS CANCELL
D.O
NORMAL
NL DE-EMPHA
NOISE CANCELL
P.B Y
PICTURE CONTROL
6dB AMP
Y/C MIC
SYNC AMP
F.B. CLAMP
VIDEO AMP
DRIVE
VIDEO OUT
Q1601
BUFFER
VIDEO OUT TO AV
Q1602,Q1631
EQ
VIDEO OUT TO RF-CONV.
DL
AMP
D.O.C PULSE
AGC
AGC 1 DET
DELAY
SYNC SEP.
L.P.F
P.B CHROMA
MUTE OR VD-INSART
AGC CONT.
1/2 fh CARRIER SHIFT
FM MODULATOR
5V DC
VR103 CARRIER
VR104 DEV.
WHITE/ DARK CLIP
MAIN EMPHASIS
NL EMPHA
DETAIL EMPHA
REC(Y)
ATT
AGC. AMP
REC (VIDEO Y/C)
REC/EE VIDEO IN
SYNC OUT
CONTROL IN
CHROMA IN
VD IN
VIDEO SIGNAL IN
PB 5V
ST.SL.×2
V-LOCK PULSE (VLP) IN FROM SERVO
PICTURE CONTROL VR
COMPOSITE SYNC. TO SERVO
VR102
SWD 5V
EE LEVEL
P.B CHROMA
CARRIER BALANCE
BURST EMPHA DE-EMPHA
P.B 627KHZ
MAIN CONVERTER
REC 4.43MHZ
4.43MHZ
5.06MHZ
VIDEO IN
XF111(1/3)
4.43MHZ B.P.F
Q1151 Q1103-Q1104
AMP
DL131
COMB FILTER
AMP
P.B ACK
CHROMA OUT
KILLER
REC-C
4.43MHZ CW
REC APC
CONTROL
4.43MHZ VXO
4.43MHZ XO
4.43MHZ X-TAL X1101
XF111 (3/3)
5.06MHZ B.P.F
KILLER
ACK DET.
SW
BURST ID-DET.
REC AFC
3rd LOCK PROTECT
FSC
Q1102
BUFFER
4.43MHZ FSC SIGNAL TO SERVO
SUB CONVERTER
CW 4.43MHZ
627KHZ
PB APC
4.43MHZ CW
SW 25
90° PHASE SHIFT (PS)
B-ID
HD
B-ID LOGIC
HD
BGP 2
X2
X2FSC TO IC102 1H-DL
1/8
5.06MHZ
PB SLD
PULSE GEN.
C-SYNC IN
C-STNC
B.G
5.06MHZ VCO
CONTROL
R1102,R1104 C1105,C1106
INTEG-RATION
MISLOCK OUT
PLL LOCK
BGP 1
VD-1 BOARD
IC171 (BA7025L) PAL/SECAM DISCRIMINATION
REC C
PB C
PB 5V
CHROMA IN
BUST GATE AMP
BGP IN
XF171
4.16MHZ FILTER
DET.
COMP 1
INTEG-RATION
COMP 2
OUTPUT TO CHROMA PROCESS
MESECAM H
B1701
PAL H
XF172
1/2fh PEAKING
Q1701 R1701 R1702
B.G.P. DET.
BDV1-12515/RP1-GIT
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

1-4. SYSTEM CONTROL & SERVO CIRCUIT BASIC BLOCK DIAGRAM


IC301 SYSTEM-CONTROL
IC351 DIGITAL SERVO
IC304
INITIALIZE RESET
IC302
LOADING MOTOR DRIVER
IC303
MECHANISM
LOADING MOTOR
ML
ERACE PREVENTION SWITCH
MECHANISM MODE SWITCH
ROTARY SW
TAKE-UP REEL SENSOR
DEW SENSOR
TAPE TOP SENSOR
TAPE END LED
TAPE END SENSOR
FL START SW
ALWAYS 5V
AL 13V
D3001
D3002
TO TIMER MPU
SSB CLK
SSB DATA
DOP
FSC
C SYNC
VLP
RF SW P
RESET
V44
+5V(HOLD)
ML-F
ML-R
ML-L
ML-M
SAFETY SW
SW DATA 3-1
REEL S
DEW S
TOP-S
END-S
FL.SW
SSB CLK
SSB DATA
RF SW P
OPTION(PIN 4)
ALWAYS 5V
4K PWM
CFG-P
TAPE SPEED
MC BR
OSC1
OSC2
XF301 4.0MHZ
V REF
R3018.R3019
REFERENCE VOLTAGE
0/1 CLK
SV SCLK
SV DATA OUT
REC H
PB H
ST+SL×2
A.MUTE+S.PLAY
AV CTL.
POWER UP
B3001
INV.
POWER UP TO PW-A
FF+REW
AV.
B3002
D.O.C
INV.
GND
GND
0/1 CK
SV-S•CLK
SV-S•DATA
NTSC/PAL
FSC IN
C-SYNC
VD
CTL SHAPE
MODE CONTROL
IC CONTROL
REF CLK
CLOCK GENERATOR
SYNC SEPAPATER
V.
H.
N.C.
MODE OUT
REF-TRK
D-WD-1
F.ADV JITTER CONTROL
D-P
NORMAL TRK
TRK-CR
TRK C.R TIME-CONSTANT
SWD 5V
MC-BR
SP
TAPE SPEED DETECTOR
EP/LP/SP
CTL
FG1
DIGITAL TRACKING
TRK
TRK DATA
S-PB DIVIDER
C-FG1
F/R
REF-D
CLK
CAPSTAN REF-GENERATOR
P.B
EDIT
REF.
REC
CAPSTAN PHASE CONTROL
CPE
CAPSTAN SPEED CONTROL
CSE
FG30/25 DIVIDER
S-PB DIVIDER
FRAME ADVANCE CONTROL
STRT STP
N.C.
REF.DELAY
REF.GENERATOR
RF-SW-P
DRUM-PHASE CONTROL
DPE
FHE
F/R
DRUM-SPEED CONTROL
D-FG
DSE
2H-DELAY AF-DELAY
VD GENERATOR
REC-CTL
D-PG DL
RF SWP
AF-SWP
DL1
CTL IN
REMARK
REC CTL
PG M.M
D-PG
VR351 (SWITCHING ADJ.)
VR361 V-LOCK (USER ADJ.)
SWD 5V
D/A CONVERT LPF
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

'EM CONTROL & SERVO CIRCUIT BASIC BLOCK DIAGRAM


IC351 DIGITAL SERVO
IC352 SERVO AMP
B3502
R3506
C3507
D3505
FF+REW
4K-PWM FILTER SW B3501
MC-F/R
TRK C.R TIME-CONSTANT
SWD 5V
N.C.
REF-TRK
D-WD-1
TRK-CR
MC-BR
SP
EP/LP/SP
F.ADV JITTER CONTROL
NORMAL TRK
TAPE SPEED DETECTOR
D-P
CTL
FG1
DIGITAL TRACKING
TRK
TRK DATA
S-PB DIVIDER
C-FG1
F/R
REF-D
P.B
EDIT
REF.
REC
CLK
CAPSTAN REF-GENERATOR
CAPSTAN PHASE CONTROL
CPE
CAPSTAN SPEED CONTROL
CSE
FG30/25 DIVIDER
FG1
S-PB DIVIDER
FRAME ADVANCE CONTROL
STRT STP
MC-BR
N.C.
REF.DELAY
REF.GENERATOR
RF-SW-P
DRUM-PHASE CONTROL
DPE
FHE
DRUM-SPEED CONTROL
DSE
D-FG
2H-DELAY AF-DELAY
VD GENERATOR
F/R
REC-CTL
D-PG DL
RF SWP
AF-SWP
DL1
CTL IN
REMARK
REC CTL
PG M.M
D-PG
VR351 (SWITCHING ADJ.)
VR361 V-LOCK (USER ADJ.)
SWD 5V
D/A CONVERT LPF
FG-1 AMP
CAPSTAN DRIVE
HEAD DRIVE
D-FG AMP
D-PG AMP
C-FG1
CAPSTAN DRIVE (MC-VS)
HEAD DRUM DRIVE (MH-VS)
C-FG
CAPSTAN MOTOR
HEAD DRUM MOTOR
D-FG
D-PG
MECHANISM
CTL REC/PB AMP
STILL+SLOW 13
REC CTL IN 12
REMARK 11
CTL PB OUT 15
STL SHAPE
THRESH HOLD SEL
SW LOGIC
TRAP
REC AMP
AGC DET
AGC AMP
CTL CHECK
CTL HEAD
BDS1-12515/RP1-GIT
10
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12
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14
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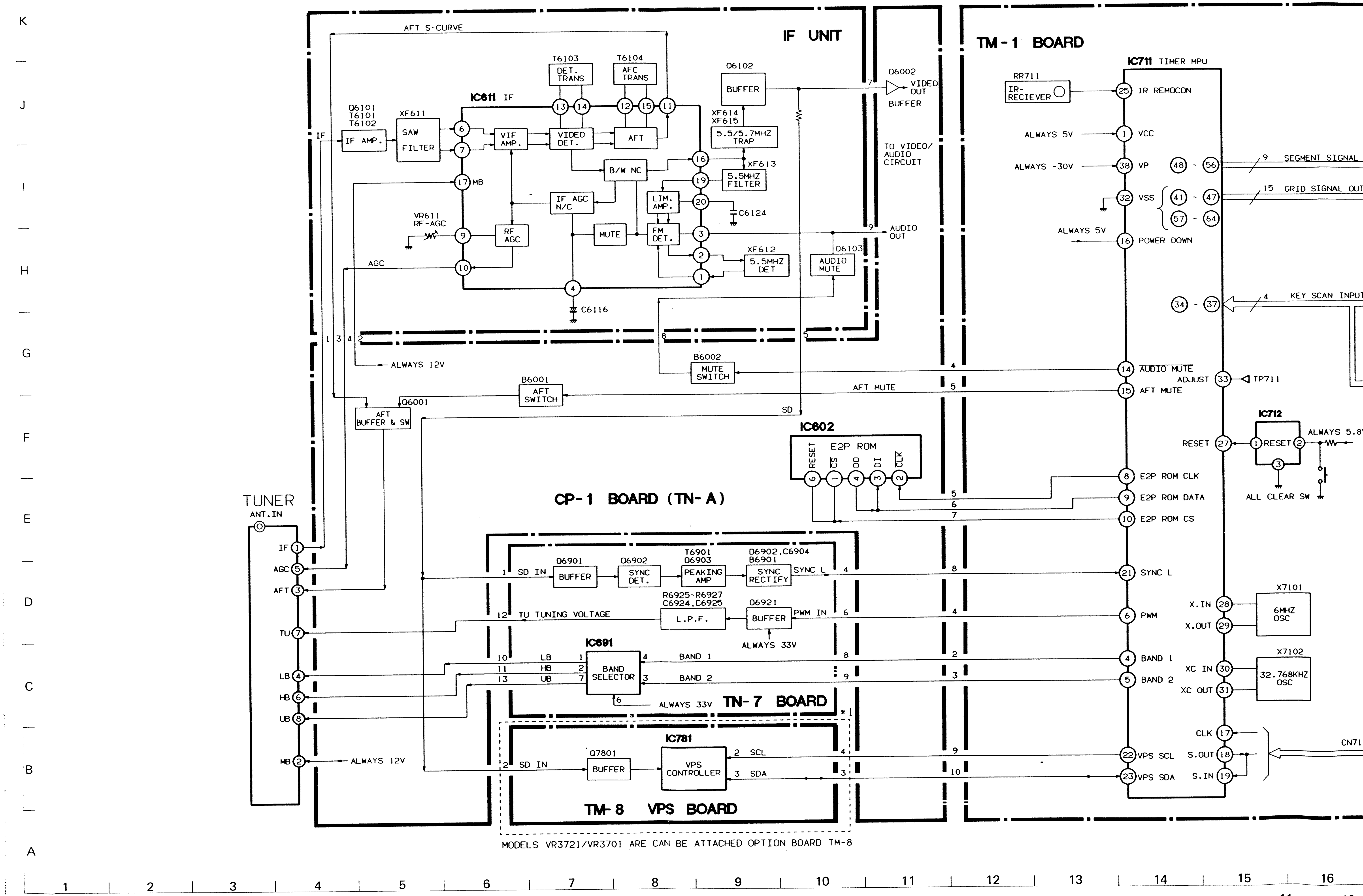
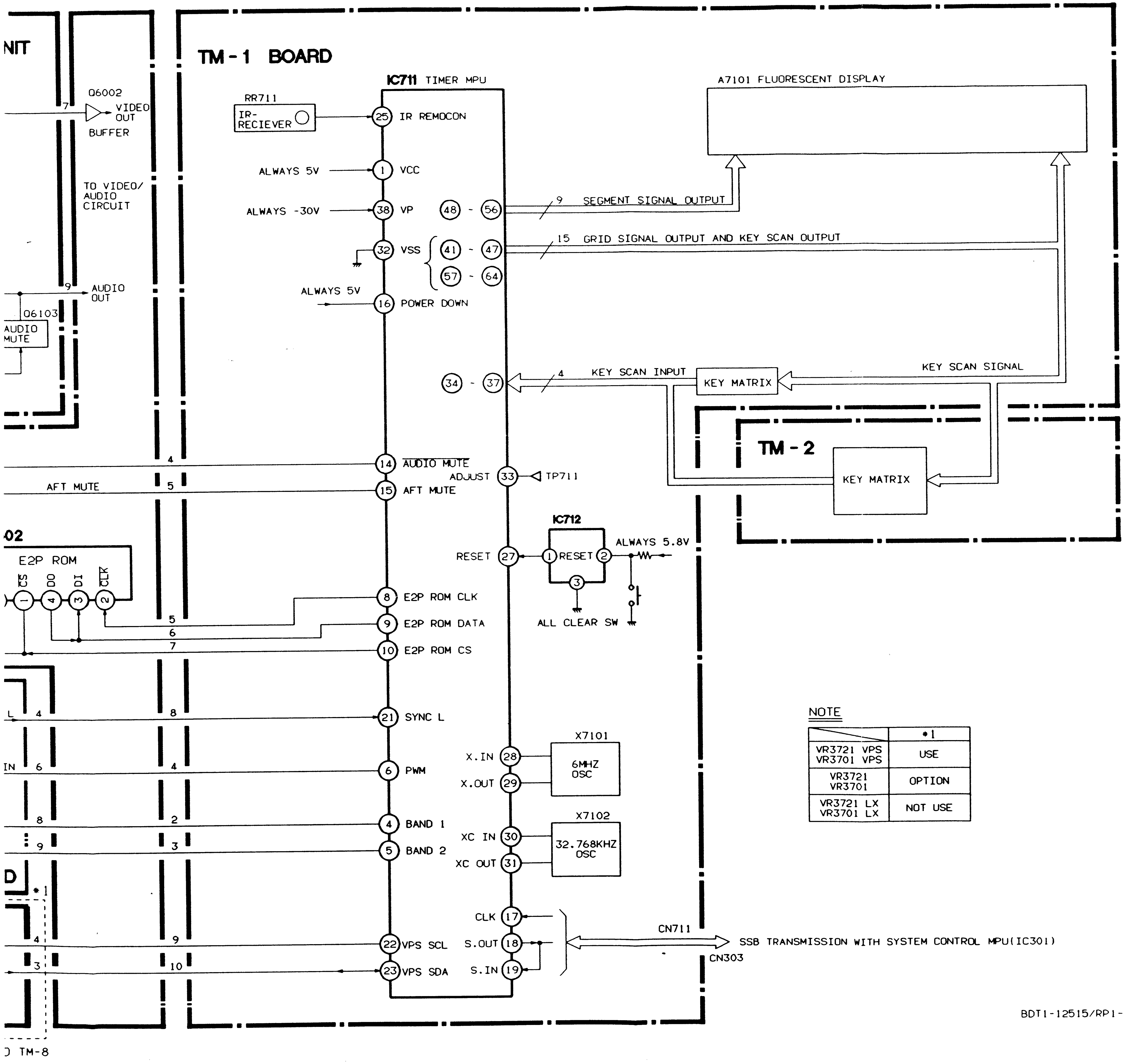
16
17
18
19
20
21
22
23

1-5. TUNING & TIMER CIRCUIT BASIC BLOCK DIAGRAM


IF UNIT
AFT S-CURVE
T6103
DET. TRANS
T6104
AFC TRANS
Q6102
BUFFER
Q6002
VIDEO OUT
BUFFER
IC611 IF
Q6101
T6101
T6102
IF AMP.
XF611
SAW FILTER
VIF AMP.
VIDEO DET.
AFT
XF614
XF615
5.5/5.7MHZ TRAP
TO VIDEO/ AUDIO CIRCUIT
B/W NC
XF613
5.5MHZ FILTER
MB
IF AGC N/C
LIM. AMP.
C6124
VR611
RF-AGC
RF AGC
MUTE
FM DET.
AUDIO OUT
XF612
5.5MHZ DET
Q6103
AUDIO MUTE
AGC
C6116
ALWAYS 12V
B6002
MUTE SWITCH
B6001
AFT SWITCH
AFT MUTE
Q6001
AFT BUFFER & SW
SD
IC602
E2P ROM
RESET
CS
DO
DI
CLK
TUNER
ANT.IN
IF
AGC
AFT
TU
LB
HB
UB
MB
ALWAYS 12V
CP-1 BOARD (TN-A)
SD IN
Q6901
BUFFER
Q6902
SYNC DET.
T6901
Q6903
PEAKING AMP
D6902,C6904
B6901
SYNC RECTIFY
SYNC L
TU TUNING VOLTAGE
R6925-R6927
C6924,C6925
L.P.F.
Q6921
BUFFER
PWM IN
ALWAYS 33V
IC691
LB
HB
UB
BAND SELECTOR
BAND 1
BAND 2
ALWAYS 33V
TN-7 BOARD
*1
IC781
Q7801
SD IN
BUFFER
VPS CONTROLLER
SCL
SDA
TM-8 VPS BOARD
TM-1 BOARD
IC711 TIMER MPU
RR711
IR-RECIEVER
IR REMOCON
ALWAYS 5V
VCC
ALWAYS -30V
VP
SEGMENT SIGNAL
VSS
GRID SIGNAL OUT
ALWAYS 5V
POWER DOWN
KEY SCAN INPUT
AUDIO MUTE
ADJUST
TP711
AFT MUTE
IC712
ALWAYS 5.8V
RESET
RESET
ALL CLEAR SW
E2P ROM CLK
E2P ROM DATA
E2P ROM CS
SYNC L
PWM
X.IN
X.OUT
X7101
6MHZ OSC
BAND 1
BAND 2
XC IN
XC OUT
X7102
32.768KHZ OSC
CLK
S.OUT
S.IN
CN71
VPS SCL
VPS SDA
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

MODELS VR3721/VR3701 ARE CAN BE ATTACHED OPTION BOARD TM-8

1-5. TUNING & TIMER CIRCUIT BASIC BLOCK DIAGRAM

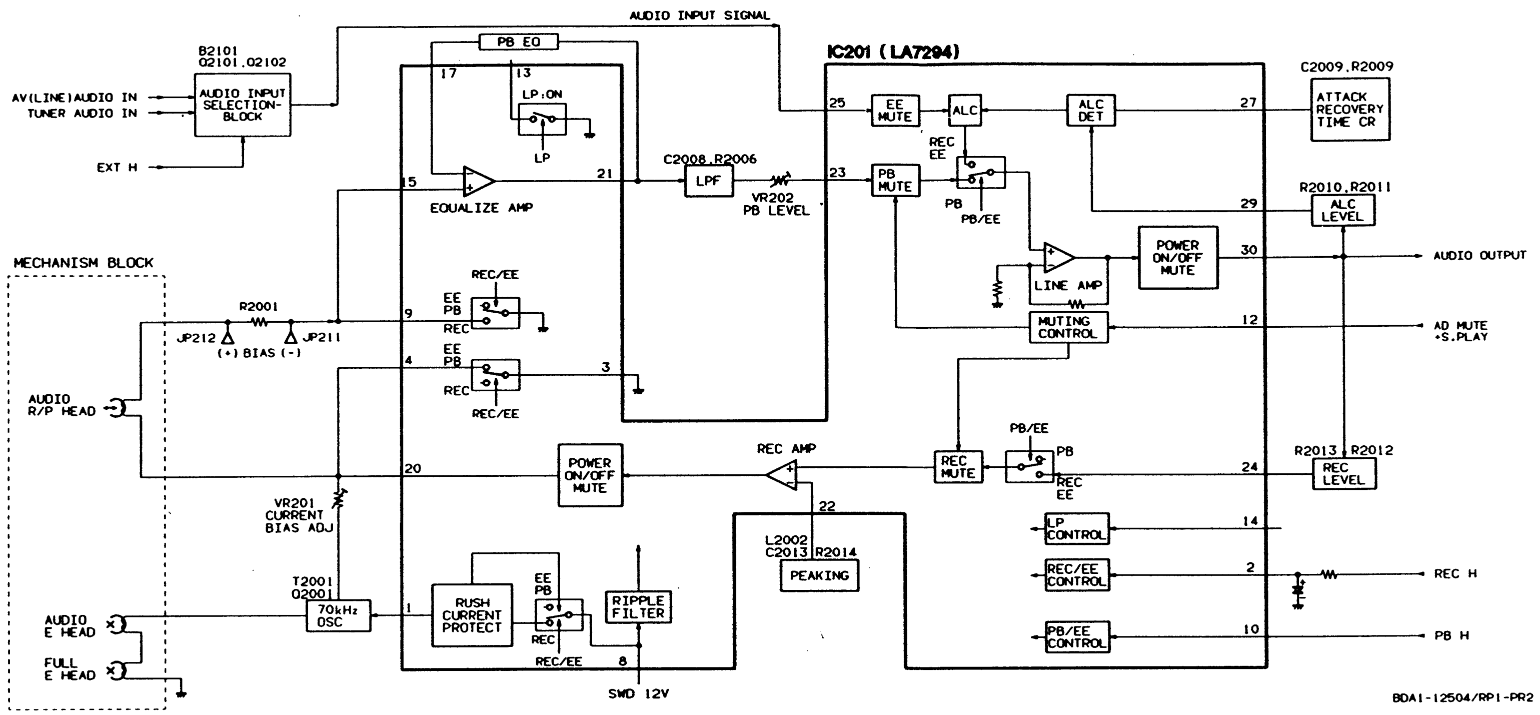

NIT
Q6002
VIDEO OUT
BUFFER
TO VIDEO/ AUDIO CIRCUIT
AUDIO OUT
Q6103
AUDIO MUTE
TM-1 BOARD
IC711 TIMER MPU
RR711
IR-RECIEVER
25 IR REMOCON
ALWAYS 5V
1 VCC
ALWAYS -30V
38 VP
48 - 56
9 SEGMENT SIGNAL OUTPUT
32 VSS
41 - 47
57 - 64
15 GRID SIGNAL OUTPUT AND KEY SCAN OUTPUT
ALWAYS 5V
16 POWER DOWN
A7101 FLUORESCENT DISPLAY
34 - 37
4 KEY SCAN INPUT
KEY MATRIX
KEY SCAN SIGNAL
TM-2
KEY MATRIX
14 AUDIO MUTE
AFT MUTE
15 AFT MUTE
ADJUST 33
TP711
02
E2P ROM
CS DO DI CLK
1 4 3 2
IC712
RESET 27
1 RESET 2
3
ALWAYS 5.8V
ALL CLEAR SW
8 E2P ROM CLK
9 E2P ROM DATA
10 E2P ROM CS
21 SYNC L
6 PWM
4 BAND 1
5 BAND 2
X7101
X.IN 28
X.OUT 29
6MHZ OSC
X7102
XC IN 30
XC OUT 31
32.768KHZ OSC
CLK 17
S.OUT 18
S.IN 19
22 VPS SCL
23 VPS SDA
CN711
CN303
SSB TRANSMISSION WITH SYSTEM CONTROL MPU(IC301)
D
*1
TM-8
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

NOTE

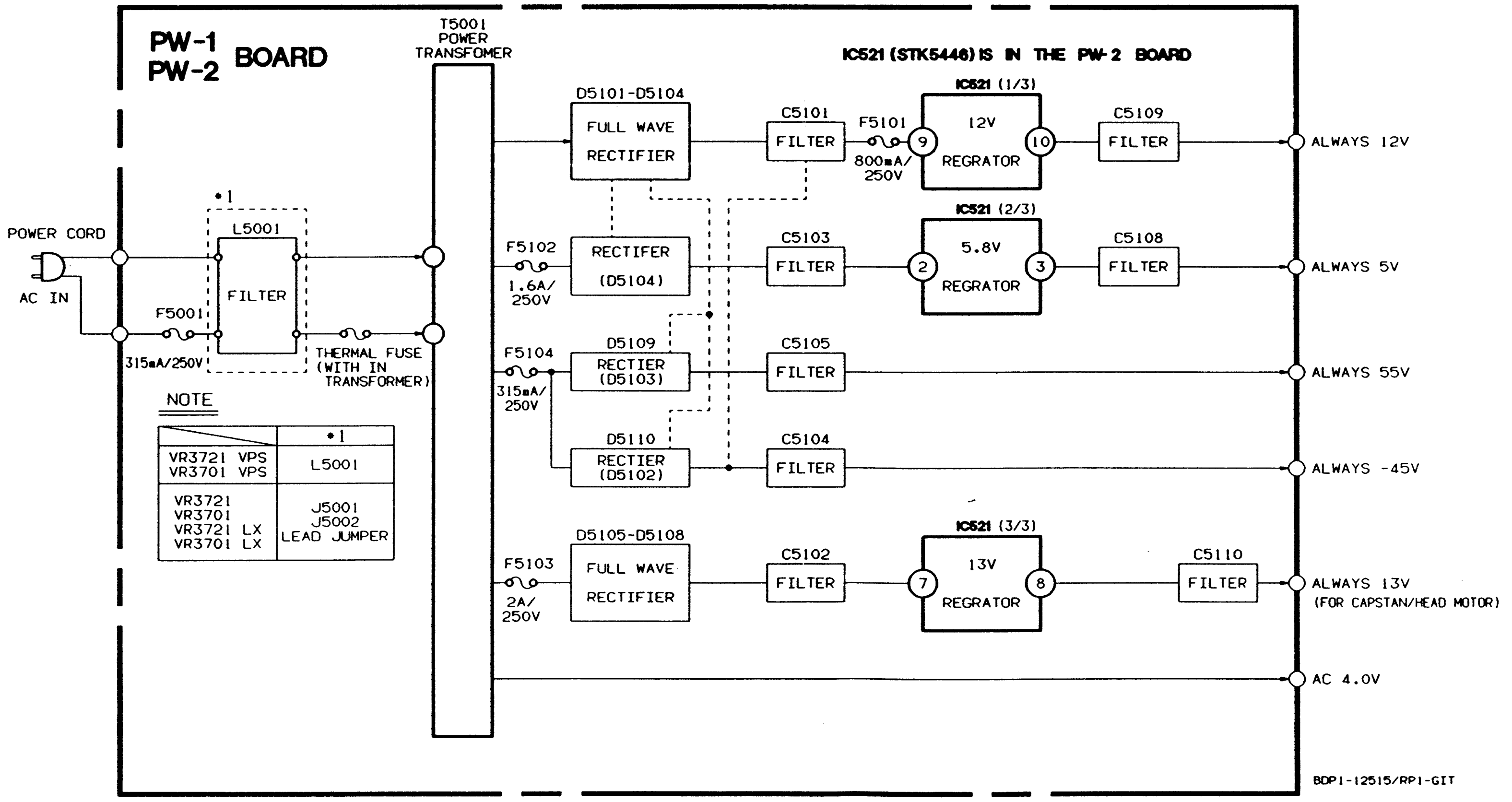
	*1
VR3721 VPS VR3701 VPS	USE
VR3721 VR3701	OPTION
VR3721 LX VR3701 LX	NOT USE

BDT1-12515/RP1-GIT

1-6. AUDIO CIRCUIT BASIC BLOCK DIAGRAM


AUDIO INPUT SIGNAL
B2101
Q2101.Q2102
AUDIO INPUT SELECTION-BLOCK
AV(LINE)AUDIO IN
TUNER AUDIO IN
EXT H
PB EQ
17
13
LP:ON
LP
15
EQUALIZE AMP
21
C2008.R2006
LPF
VR202
PB LEVEL
MECHANISM BLOCK
R2001
JP212
JP211
(+) BIAS (-)
9
REC/EE
EE
PB
REC
4
3
AUDIO
R/P HEAD
20
POWER ON/OFF MUTE
REC AMP
22
VR201
CURRENT
BIAS ADJ
L2002
C2013
R2014
PEAKING
T2001
Q2001
70kHz OSC
1
RUSH CURRENT PROTECT
RIPPLE FILTER
8
SWD 12V
AUDIO
E HEAD
FULL
E HEAD
IC201 (LA7294)
25
EE MUTE
ALC
ALC DET
27
C2009.R2009
ATTACK RECOVERY TIME CR
23
PB MUTE
PB
PB/EE
29
R2010.R2011
ALC LEVEL
LINE AMP
30
AUDIO OUTPUT
MUTING CONTROL
12
AD MUTE
•S.PLAY
REC MUTE
24
R2013
R2012
REC LEVEL
14
LP CONTROL
2
REC/EE CONTROL
REC H
10
PB/EE CONTROL
PB H
BDA1-12504/RP1-PR2

1-7. POWER SUPPLY CIRCUIT BASIC BLOCK DIAGRAM


PW-1
PW-2
BOARD
T5001
POWER
TRANSFOMER
IC521 (STK5446) IS IN THE PW-2 BOARD
POWER CORD
AC IN
•1
L5001
FILTER
F5001
315mA/250V
THERMAL FUSE
(WITH IN
TRANSFORMER)
D5101-D5104
FULL WAVE
RECTIFIER
C5101
FILTER
F5101
800mA/
250V
IC521 (1/3)
9
12V
REGRATOR
10
C5109
FILTER
ALWAYS 12V
F5102
1.6A/
250V
RECTIFER
(D5104)
C5103
FILTER
IC521 (2/3)
2
5.8V
REGRATOR
3
C5108
FILTER
ALWAYS 5V
F5104
315mA/
250V
D5109
RECTIER
(D5103)
C5105
FILTER
ALWAYS 55V
D5110
RECTIER
(D5102)
C5104
FILTER
ALWAYS -45V
F5103
2A/
250V
D5105-D5108
FULL WAVE
RECTIFIER
C5102
FILTER
IC521 (3/3)
7
13V
REGRATOR
8
C5110
FILTER
ALWAYS 13V
(FOR CAPSTAN/HEAD MOTOR)
AC 4.0V
BDP1-12515/RP1-GIT

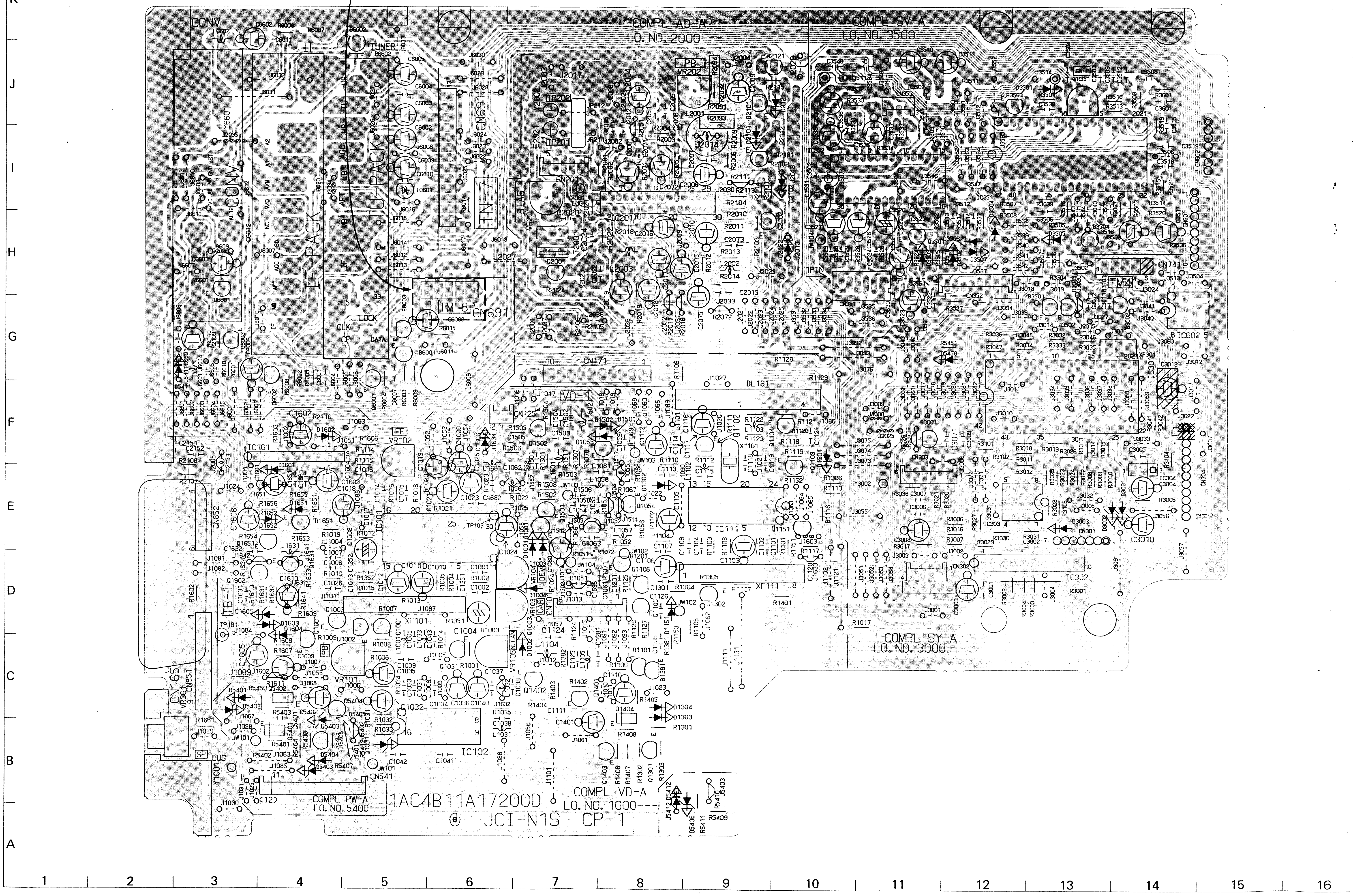
NOTE

	•1
VR3721 VPS VR3701 VPS	L5001
VR3721 VR3701 VR3721 LX VR3701 LX	J5001 J5002 LEAD JUMPER

2. CIRCUIT DIAGRAM & CIRCUIT BOARD

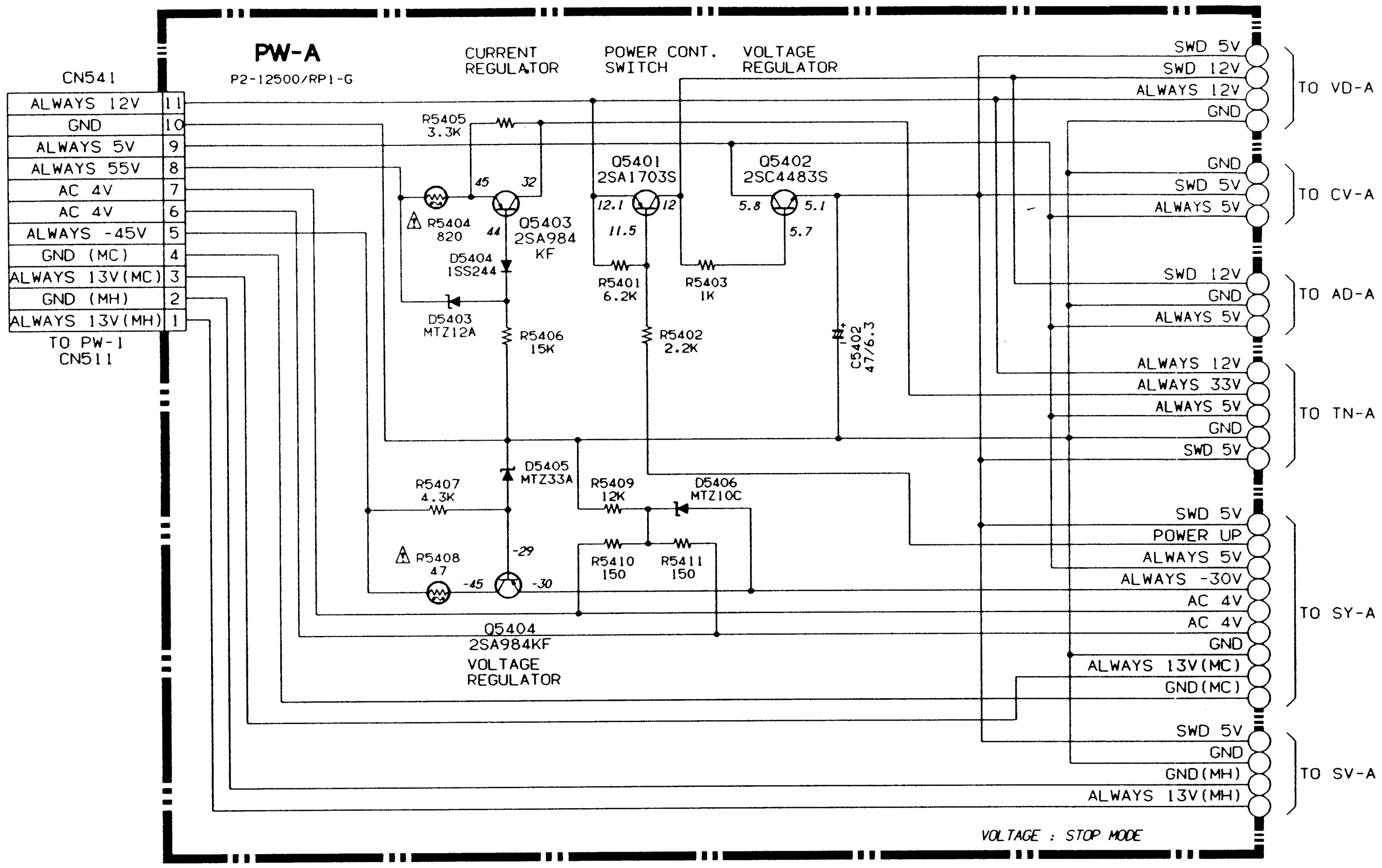
* The option board TM-8 is installed below for models VR3721 and VR3701.

2-1. CP-1 CIRCUIT BOARD


COMPL AD-A
LO. NO. 2000---
COMPL SV-A
LO. NO. 3500---
COMPL SY-A
LO. NO. 3000---
COMPL VD-A
LO. NO. 1000---
COMPL PW-A
LO. NO. 5400---
1AC4B11A17200D
JCI-N1S CP-1
CONV
IF PACK
TU PACK
TUNER
TM-8
CN691
CN171
DL131
IC161
IC101
IC102
IC301
IC302
IC602
CN852
CN851
CN541
CN741
TM4
VD-1
EE
PB
SP
LUG
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

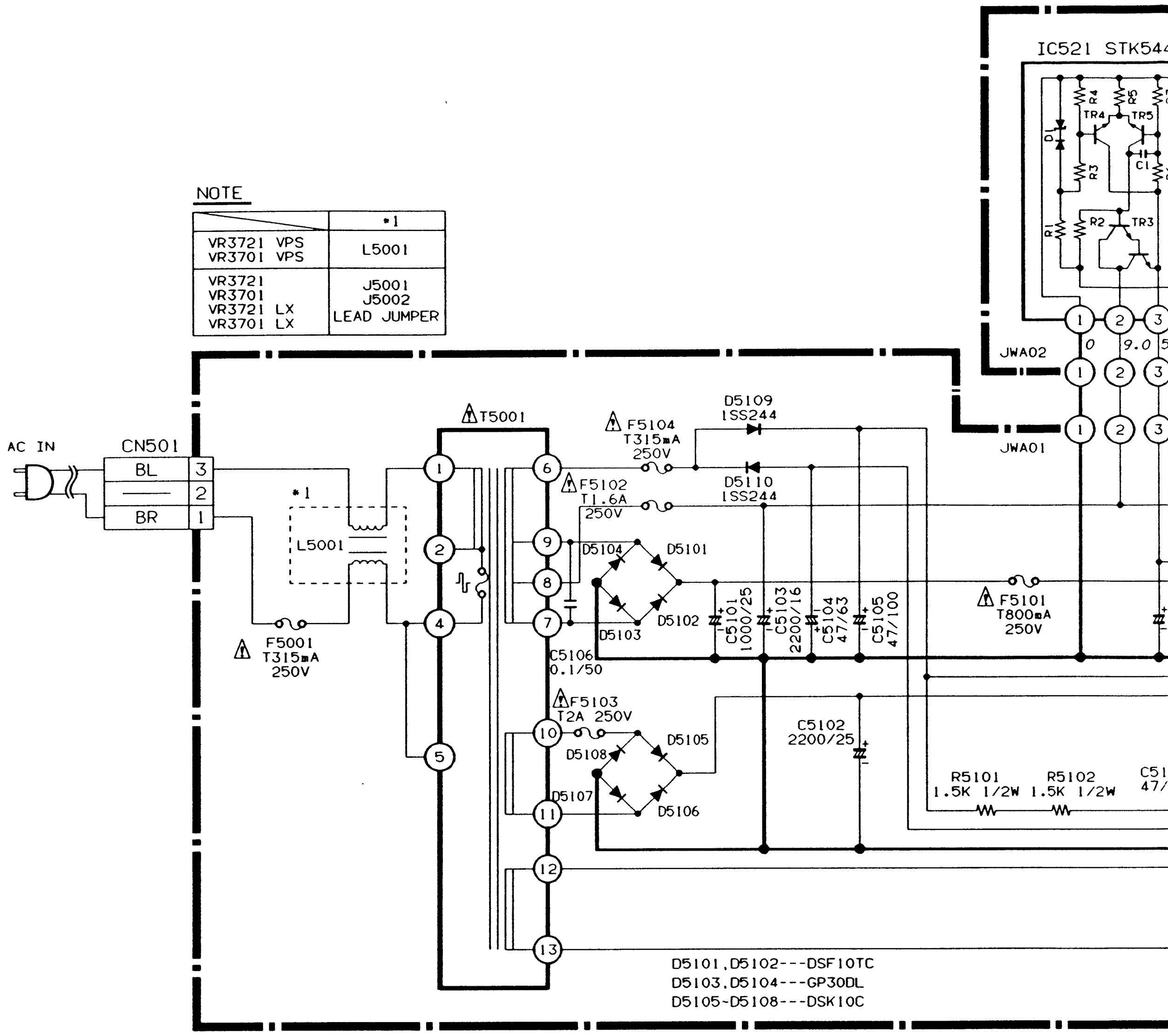
K
J
I
H
G
F
E
D
C
B
A

2-2. CP-1 BOARD (PW-A) POWER SUPPLY CIRCUIT DIAGRAM



PW-A
P2-12500/RP1-G
CN541
ALWAYS 12V 11
GND 10
ALWAYS 5V 9
ALWAYS 55V 8
AC 4V 7
AC 4V 6
ALWAYS -45V 5
GND (MC) 4
ALWAYS 13V(MC) 3
GND (MH) 2
ALWAYS 13V(MH) 1
TO PW-1 CN511
CURRENT REGULATOR
POWER CONT. SWITCH
VOLTAGE REGULATOR
R5405 3.3K
Q5401 2SA1703S
Q5402 2SC4483S
12.1
12
11.5
5.8
5.1
5.7
45
32
44
R5404 820
Q5403 2SA984 KF
D5404 1SS244
D5403 MTZ12A
R5406 15K
R5401 6.2K
R5403 1K
R5402 2.2K
C5402 47/6.3
R5407 4.3K
D5405 MTZ33A
R5409 12K
D5406 MTZ10C
R5408 47
-29
-45
-30
R5410 150
R5411 150
Q5404 2SA984KF
VOLTAGE REGULATOR
SWD 5V
SWD 12V
ALWAYS 12V
GND
TO VD-A
GND
SWD 5V
ALWAYS 5V
TO CV-A
SWD 12V
GND
ALWAYS 5V
TO AD-A
ALWAYS 12V
ALWAYS 33V
ALWAYS 5V
GND
SWD 5V
TO TN-A
SWD 5V
POWER UP
ALWAYS 5V
ALWAYS -30V
AC 4V
AC 4V
GND
ALWAYS 13V(MC)
GND(MC)
TO SY-A
SWD 5V
GND
GND(MH)
ALWAYS 13V(MH)
TO SV-A
VOLTAGE : STOP MODE

2-3. PW-1,2 BOARD POWER SUPPLY CIRCUIT DIAG

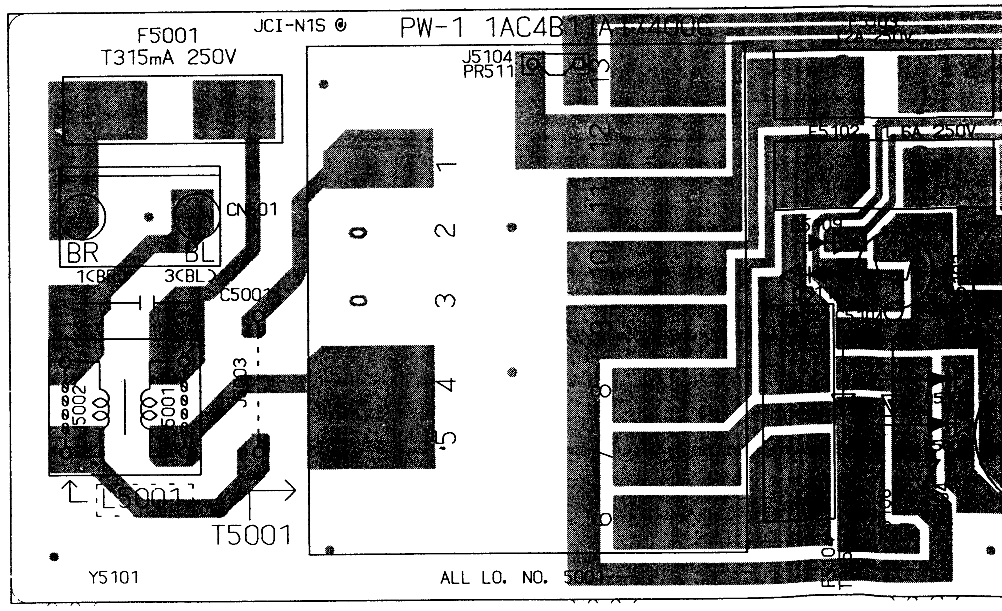


NOTE

	*1
VR3721 VPS VR3701 VPS	L5001
VR3721 VR3701 VR3721 LX VR3701 LX	J5001 J5002 LEAD JUMPER

IC521 STK544
R4
R5
TR4
TR5
D1
R3
C1
R1
R2
TR3
JWA02
JWA01
9.0
AC IN
CN501
BL 3
2
BR 1
*1
L5001
F5001 T315mA 250V
T5001
F5104 T315mA 250V
D5109 1SS244
D5110 1SS244
F5102 T1.6A 250V
D5104
D5101
D5103
D5102
C5101 1000/25
C5103 2200/16
C5104 47/63
C5105 47/100
F5101 T800mA 250V
C5106 0.1/50
F5103 T2A 250V
D5108
D5105
D5107
D5106
C5102 2200/25
R5101 1.5K 1/2W
R5102 1.5K 1/2W
C51 47/
D5101,D5102---DSF10TC
D5103,D5104---GP30DL
D5105-D5108---DSK10C

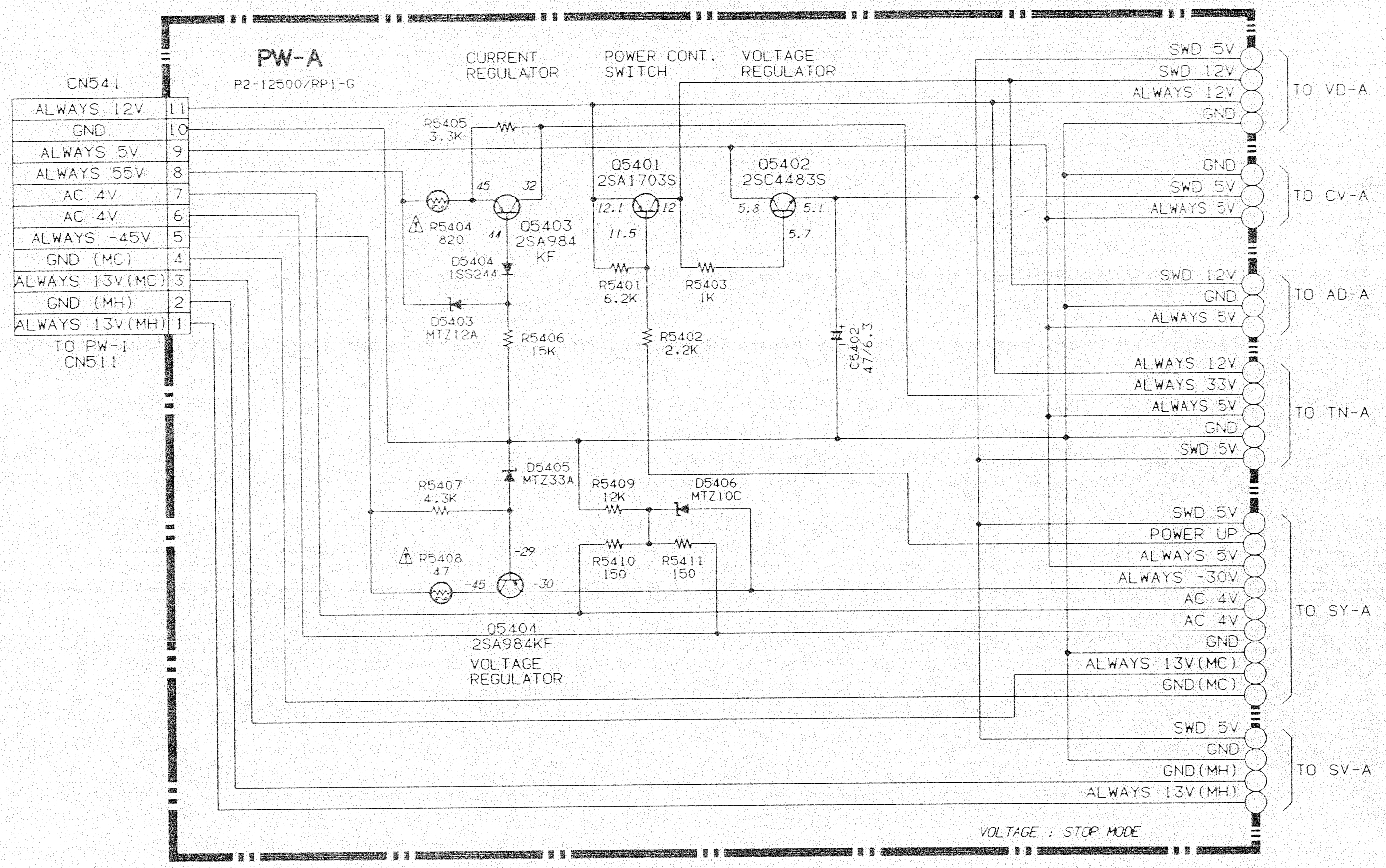
2-4. PW-1 CIRCUIT BOARD



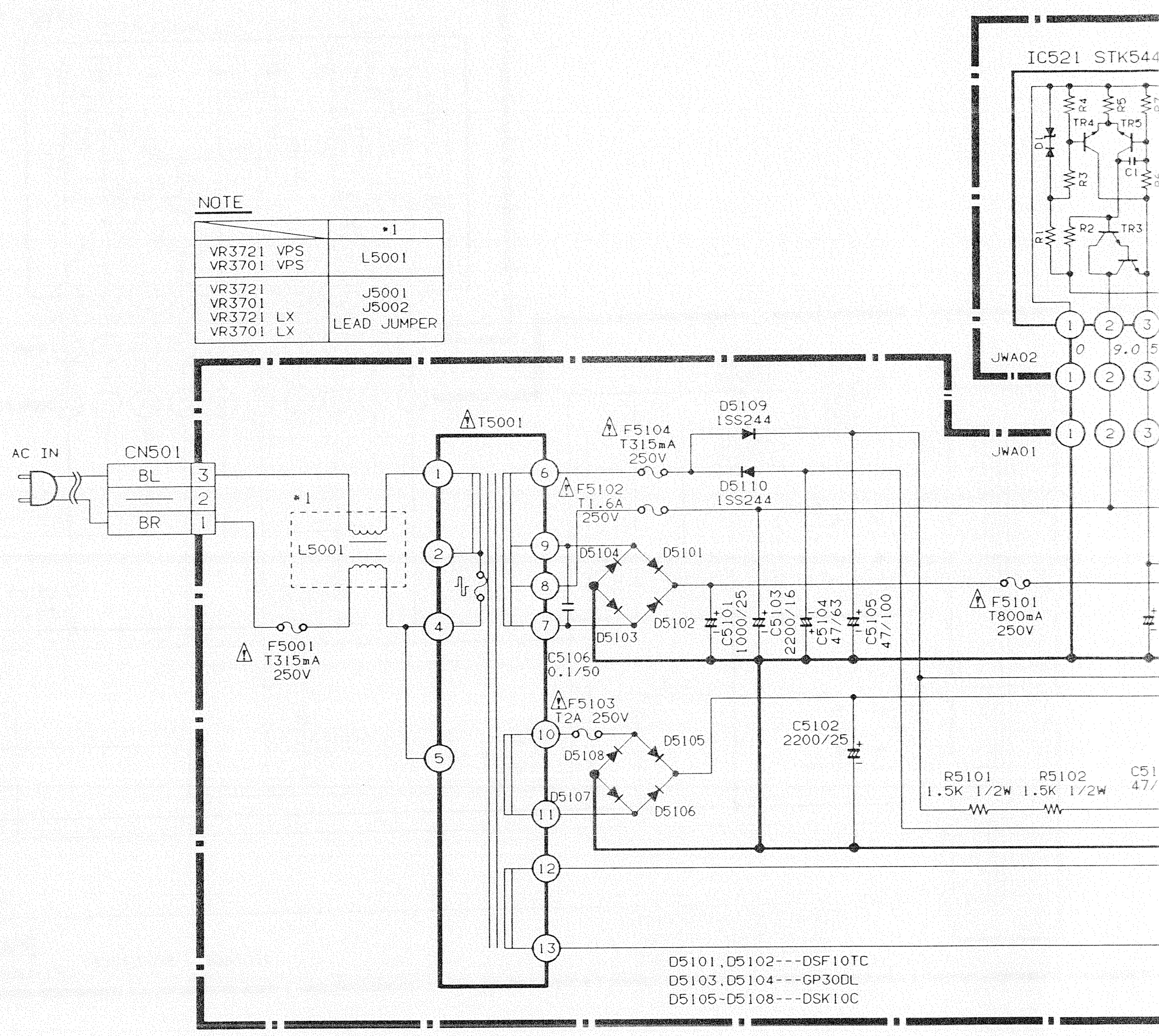
F5001
T315mA 250V
JCI-N1S
PW-1 1AC4B11A17400C
J5104
PR511
CN501
BR
BL
1(BR
3(BL
C5001
J5002
J5001
J5003
L5001
T5001
F5102 T1.6A 250V
Y5101
ALL LO. NO. 5001

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

2-2. CP-1 BOARD (PW-A) POWER SUPPLY CIRCUIT DIAGRAM


PW-A
P2-12500/RP1-G
CURRENT REGULATOR
POWER CONT. SWITCH
VOLTAGE REGULATOR
CN541
ALWAYS 12V 11
GND 10
ALWAYS 5V 9
ALWAYS 55V 8
AC 4V 7
AC 4V 6
ALWAYS -45V 5
GND (MC) 4
ALWAYS 13V(MC) 3
GND (MH) 2
ALWAYS 13V(MH) 1
TO PW-1 CN511
R5405 3.3K
R5404 820
Q5403 2SA984 KF
D5404 1SS244
D5403 MTZ12A
R5406 15K
Q5401 2SA1703S
R5401 6.2K
R5402 2.2K
Q5402 2SC4483S
R5403 1K
C5402 47/6.3
D5405 MTZ33A
R5407 4.3K
R5409 12K
D5406 MTZ10C
R5408 47
R5410 150
R5411 150
Q5404 2SA984KF VOLTAGE REGULATOR
SWD 5V
SWD 12V
ALWAYS 12V
GND
TO VD-A
GND
SWD 5V
ALWAYS 5V
TO CV-A
SWD 12V
GND
ALWAYS 5V
TO AD-A
ALWAYS 12V
ALWAYS 33V
ALWAYS 5V
GND
SWD 5V
TO TN-A
SWD 5V
POWER UP
ALWAYS 5V
ALWAYS -30V
AC 4V
AC 4V
GND
ALWAYS 13V(MC)
GND(MC)
TO SY-A
SWD 5V
GND
GND(MH)
ALWAYS 13V(MH)
TO SV-A
VOLTAGE : STOP MODE

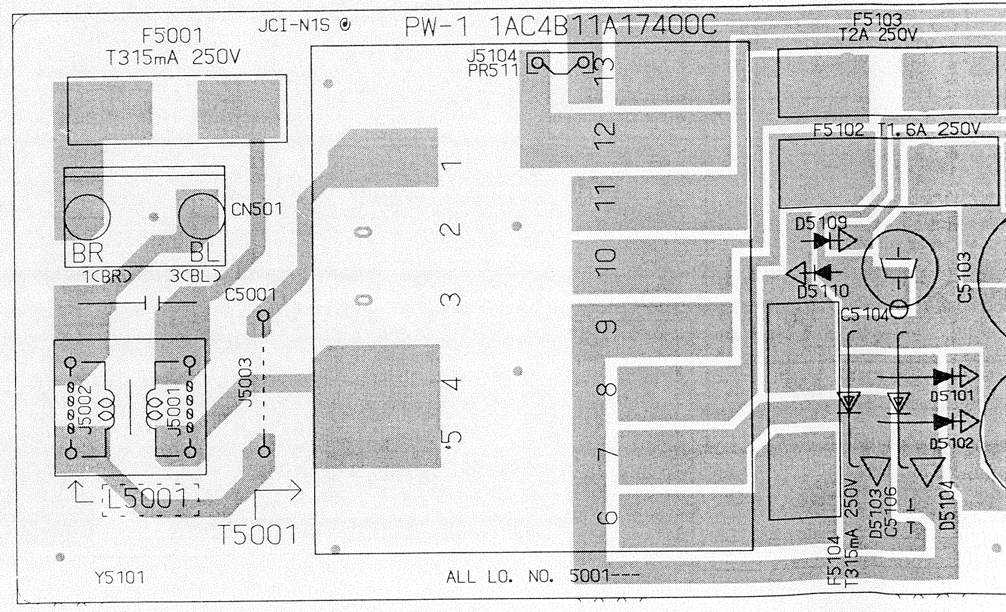
2-3. PW-1,2 BOARD POWER SUPPLY CIRCUIT DIAG


NOTE

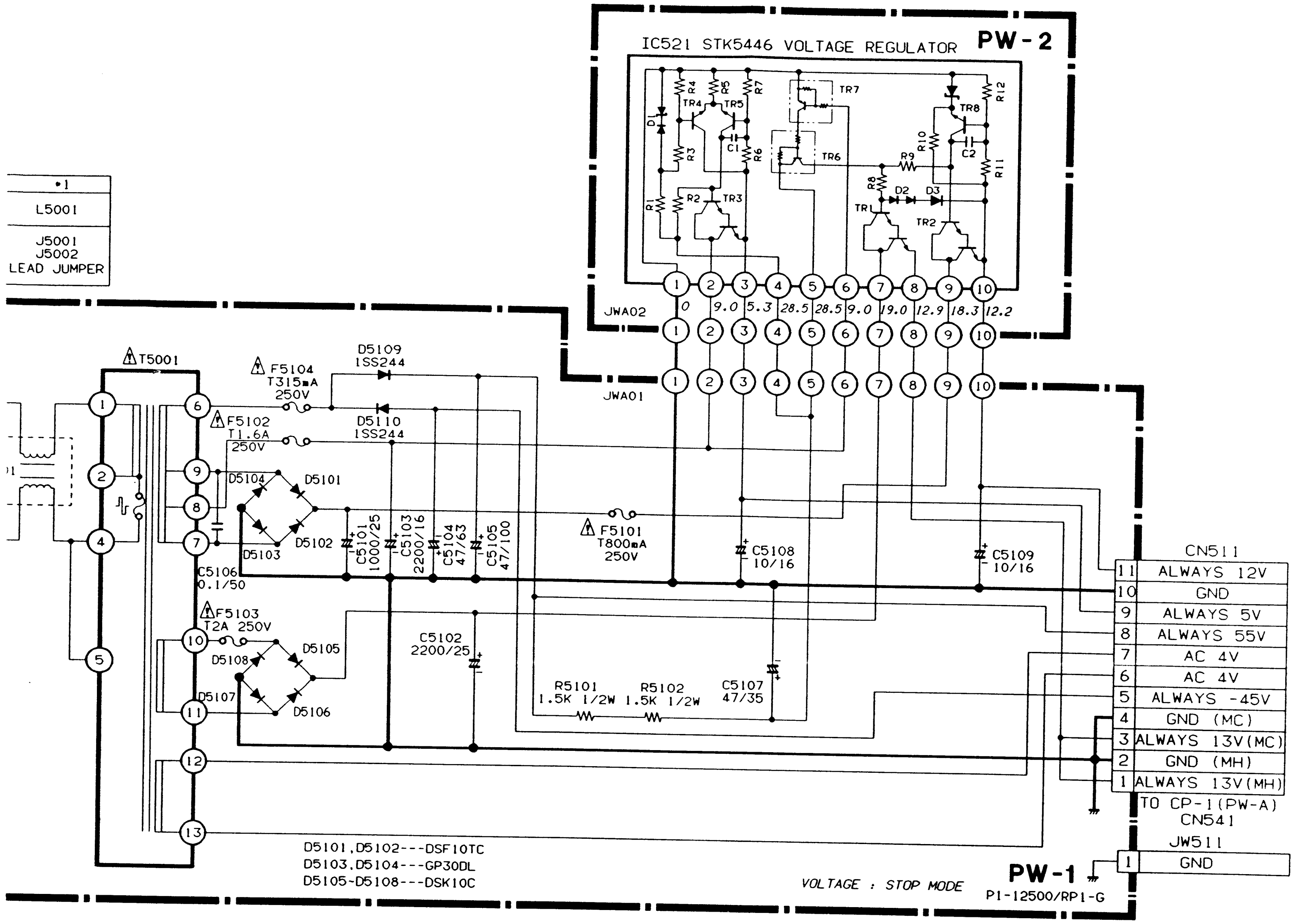
	*1
VR3721 VPS VR3701 VPS	L5001
VR3721 VR3701 VR3721 LX VR3701 LX	J5001 J5002 LEAD JUMPER

IC521 STK54
JWA02
JWA01
AC IN
CN501
BL
BR
L5001
F5001 T315mA 250V
T5001
F5104 T315mA 250V
D5109 1SS244
F5102 T1.6A 250V
D5110 1SS244
D5104
D5101
D5103
D5102
C5101 1000/25
C5103 2200/16
C5104 47/63
C5105 47/100
F5101 T800mA 250V
C5106 0.1/50
F5103 T2A 250V
D5108
D5105
D5107
D5106
C5102 2200/25
R5101 1.5K 1/2W
R5102 1.5K 1/2W
D5101,D5102---DSF10TC
D5103,D5104---GP30DL
D5105-D5108---DSK10C

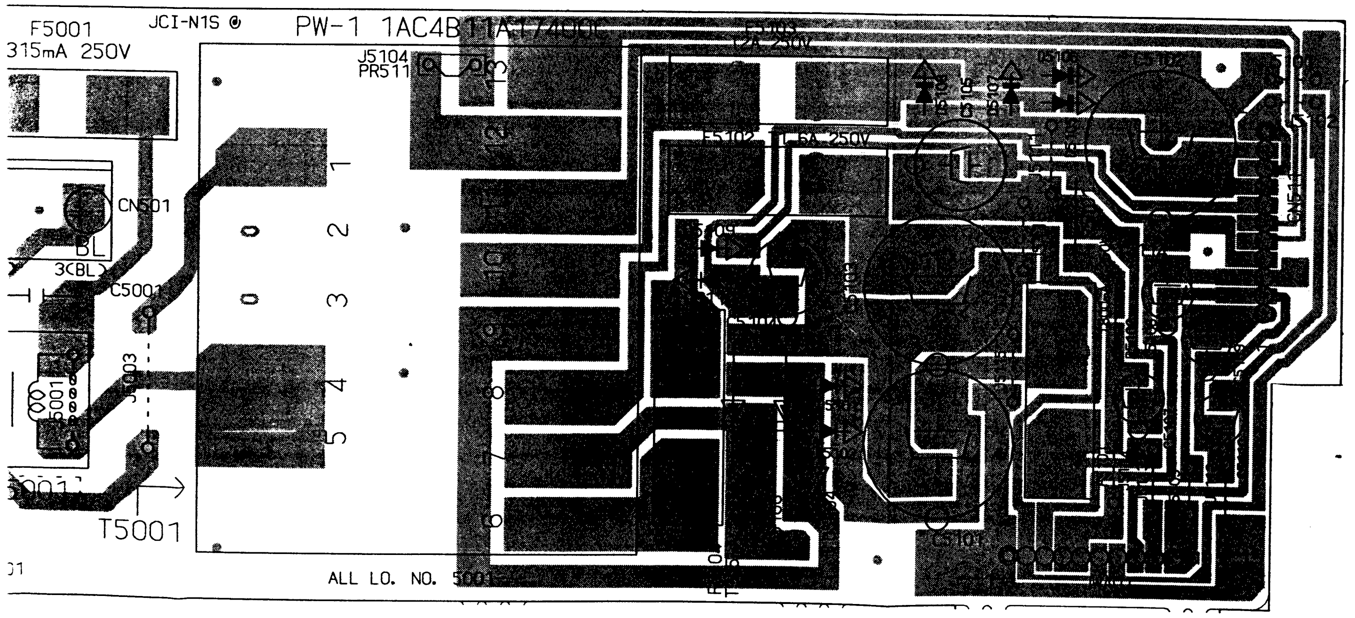
2-4. PW-1 CIRCUIT BOARD


F5001 T315mA 250V
JCI-N1S
PW-1 1AC4B11A17400C
J5104 PR511
F5103 T2A 250V
F5102 T1.6A 250V
CN501
BR
BL
1(BR)
3(BL)
C5001
J5002
J5001
J5003
L5001
T5001
D5109
D5110
C5104
C5103
D5101
D5102
D5103
D5104
C5106
F5104 T315mA 250V
Y5101
ALL LO. NO. 5001---

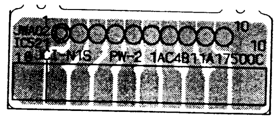
2-3. PW-1,2 BOARD POWER SUPPLY CIRCUIT DIAGRAM


IC521 STK5446 VOLTAGE REGULATOR
PW-2
R4
R5
R7
TR7
R12
TR4
TR5
TR8
D1
R3
C1
R6
TR6
R9
R10
C2
R11
R8
D2
D3
R1
R2
TR3
TR1
TR2
JWA02
0
9.0
5.3
28.5
28.5
9.0
19.0
12.9
18.3
12.2
JWA01
•1
L5001
J5001
J5002
LEAD JUMPER
T5001
F5104
T315mA
250V
D5109
1SS244
F5102
T1.6A
250V
D5110
1SS244
D5104
D5101
D5103
D5102
C5101
1000/25
C5103
2200/16
C5104
47/63
C5105
47/100
F5101
T800mA
250V
C5108
10/16
C5109
10/16
C5106
0.1/50
F5103
T2A 250V
D5108
D5105
C5102
2200/25
D5107
D5106
R5101
1.5K 1/2W
R5102
1.5K 1/2W
C5107
47/35
CN511
11 ALWAYS 12V
10 GND
9 ALWAYS 5V
8 ALWAYS 55V
7 AC 4V
6 AC 4V
5 ALWAYS -45V
4 GND (MC)
3 ALWAYS 13V(MC)
2 GND (MH)
1 ALWAYS 13V(MH)
TO CP-1(PW-A)
CN541
JW511
1 GND
D5101,D5102---DSF10TC
D5103,D5104---GP30DL
D5105~D5108---DSK10C
VOLTAGE : STOP MODE
PW-1
P1-12500/RP1-G

2-4. PW-1 CIRCUIT BOARD

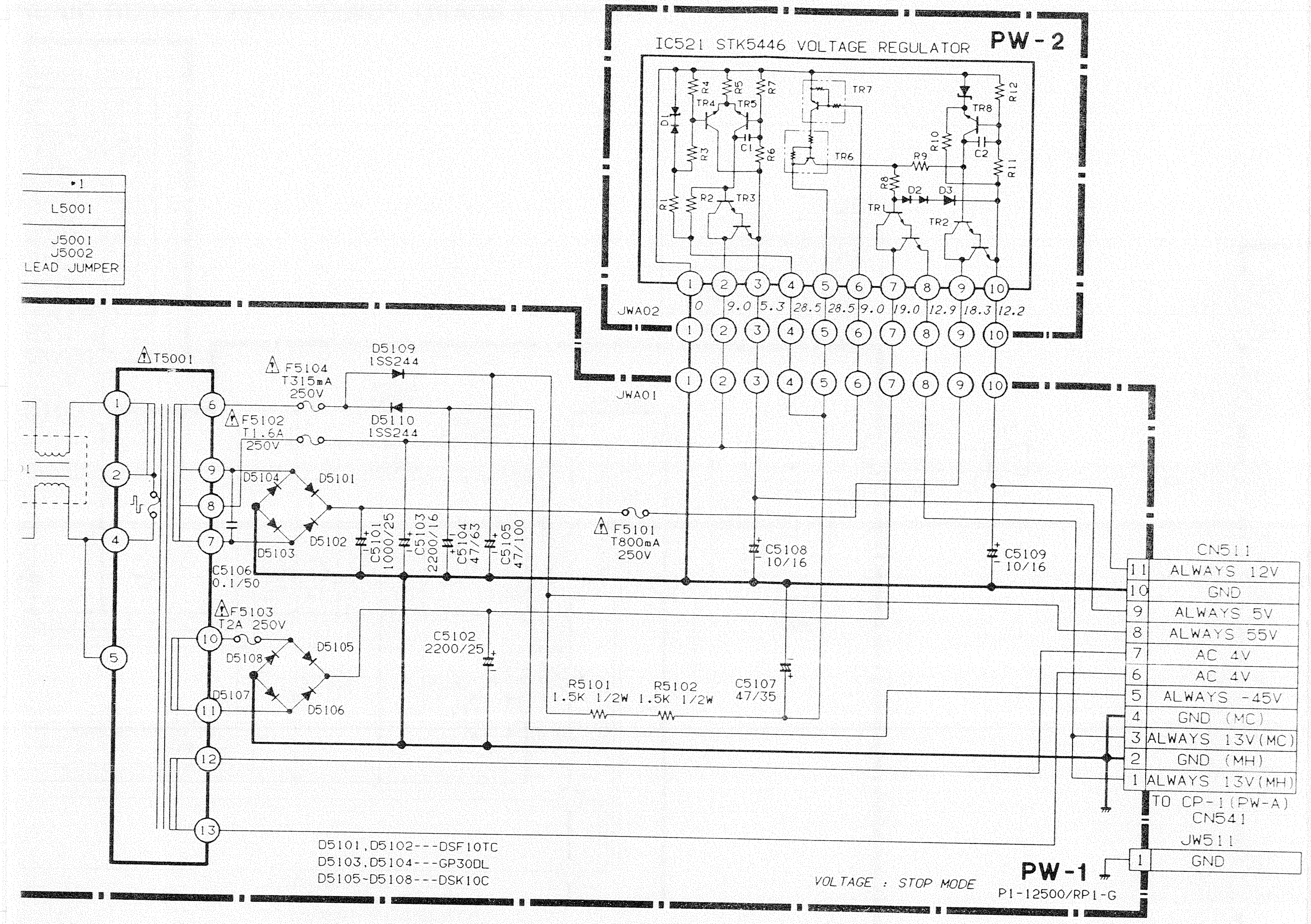

F5001
315mA 250V
JCI-N1S
PW-1 1AC4B11A17400C
J5104
PR511
F5102 T1.6A 250V
CN501
3CBL
C5001
J5003
T5001
CN511
ALL LO. NO. 5001

2-5. PW-2 CIRCUIT BOARD


JWA02
IC521
JCI-N1S
PW-2 1AC4B11A17500C
10

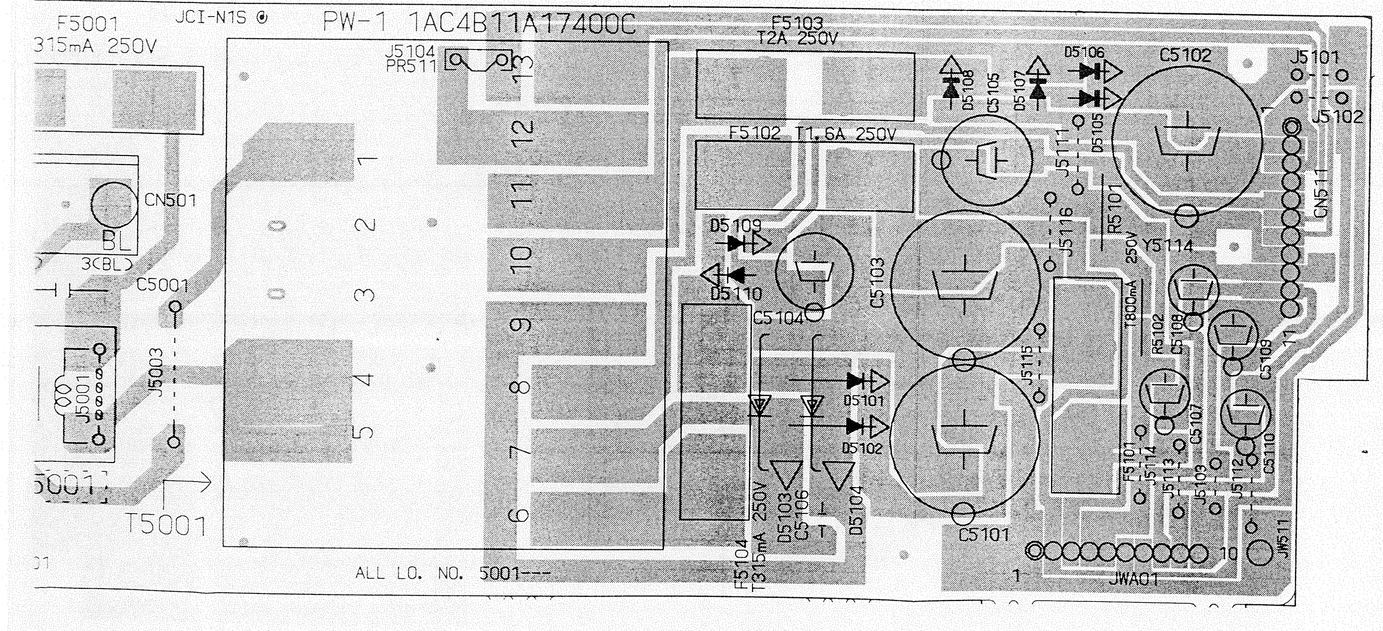
12 13 14 15 16 17 18 19 20 21 22 23

2-3. PW-1,2 BOARD POWER SUPPLY CIRCUIT DIAGRAM



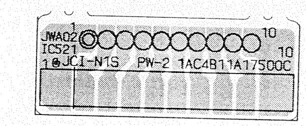
IC521 STK5446 VOLTAGE REGULATOR
PW-2
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12
TR1 TR2 TR3 TR4 TR5 TR6 TR7 TR8
D1 D2 D3 C1 C2
JWA02
0 9.0 5.3 28.5 28.5 9.0 19.0 12.9 18.3 12.2
JWA01
*1
L5001
J5001
J5002
LEAD JUMPER
T5001
F5104 T315mA 250V
F5102 T1.6A 250V
D5109 1SS244
D5110 1SS244
D5101 D5102 D5103 D5104
C5106 0.1/50
C5101 1000/25
C5103 2200/16
C5104 47/63
C5105 47/100
F5101 T800mA 250V
C5108 10/16
C5109 10/16
F5103 T2A 250V
D5105 D5106 D5107 D5108
C5102 2200/25
R5101 1.5K 1/2W
R5102 1.5K 1/2W
C5107 47/35
CN511
11 ALWAYS 12V
10 GND
9 ALWAYS 5V
8 ALWAYS 55V
7 AC 4V
6 AC 4V
5 ALWAYS -45V
4 GND (MC)
3 ALWAYS 13V(MC)
2 GND (MH)
1 ALWAYS 13V(MH)
TO CP-1(PW-A) CN541
JW511
1 GND
D5101,D5102---DSF10TC
D5103,D5104---GP30DL
D5105-D5108---DSK10C
VOLTAGE : STOP MODE
PW-1
P1-12500/RP1-G

2-4. PW-1 CIRCUIT BOARD



F5001 315mA 250V
JCI-N1S
PW-1 1AC4B11A17400C
J5104
PR511
CN501
BL
3(BL)
C5001
J5001
J5003
T5001
F5103 T2A 250V
F5102 T1.6A 250V
D5109 D5110
C5104 C5103
D5101 D5102 D5103 D5104
C5106
F5104 T315mA 250V
D5106 D5105 D5107
C5102 C5101
J5111 J5116 J5115
R5101 R5102
F5101 T800mA 250V
C5108 C5109 C5107 C5110
J5101 J5102
CN511
JWA01
JW511
J5113 J5114 J5112 J5109
ALL LO. NO. 5001---

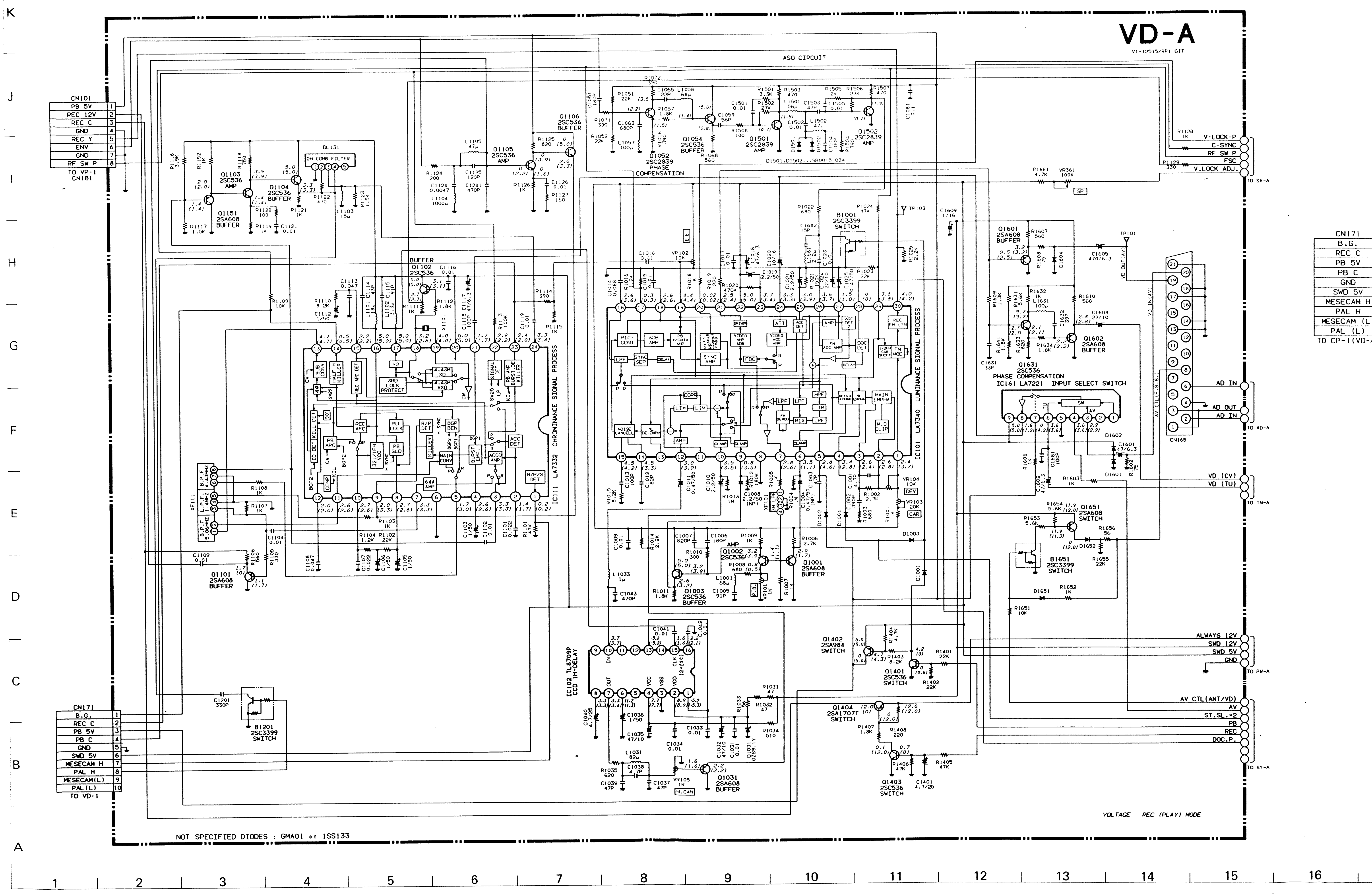
2-5. PW-2 CIRCUIT BOARD



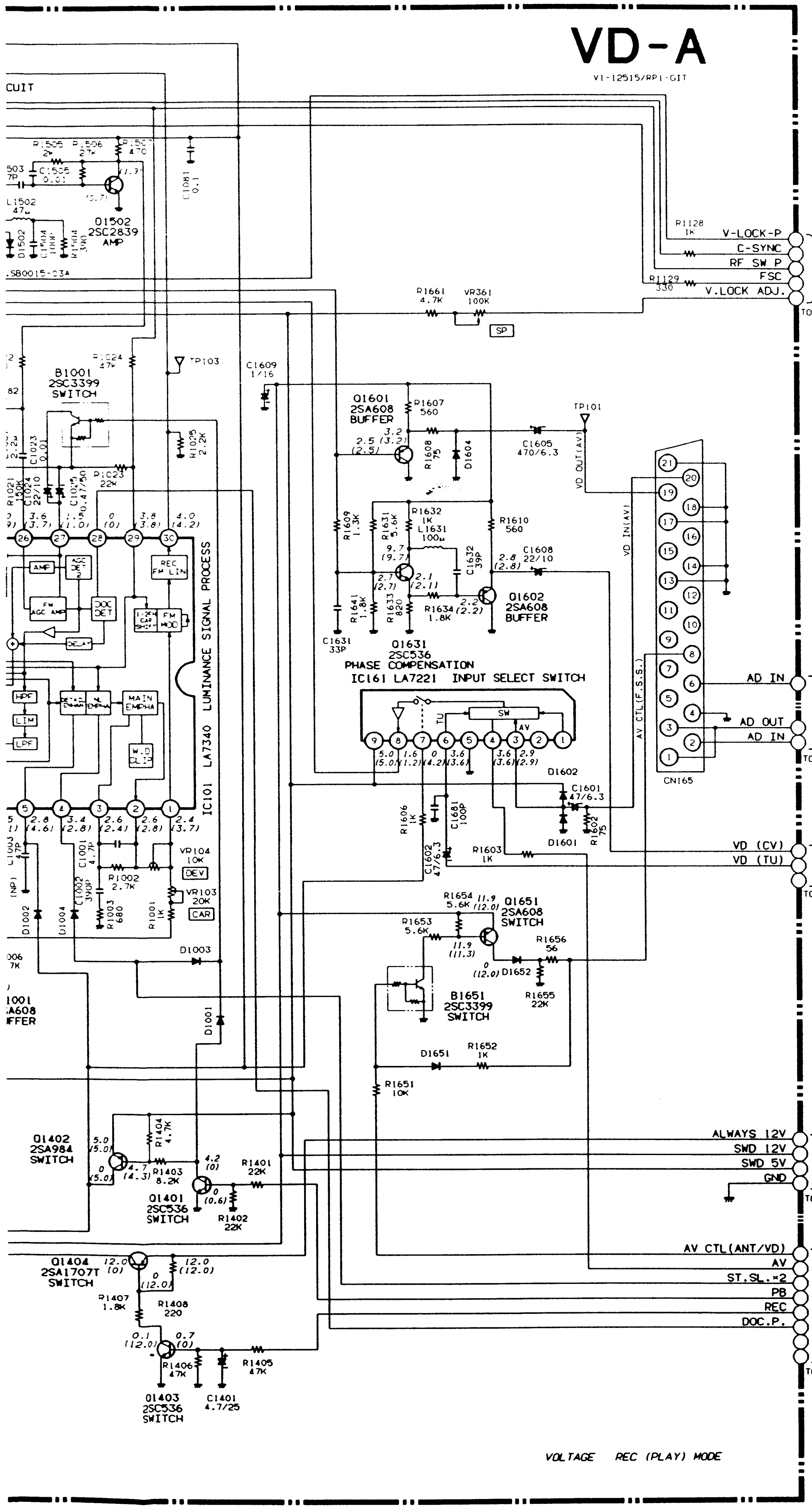
JWA02
IC521
JCI-N1S
PW-2 1AC4B11A175000
1
10

12 13 14 15 16 17 18 19 20 21 22 23

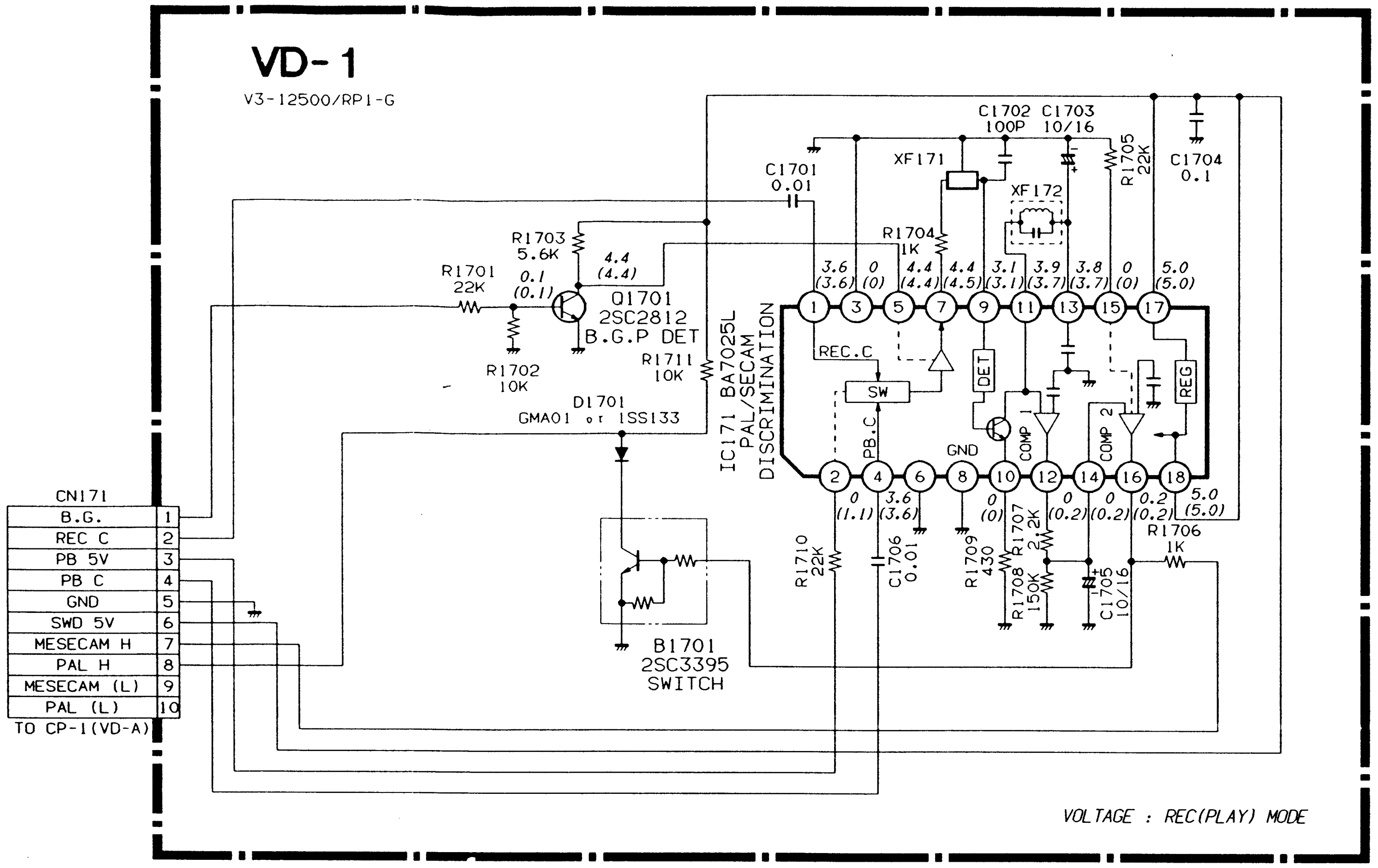
2-6. CP-1 BOARD (VD-A) VIDEO CIRCUIT DIAGRAM


VD-A
V1-12515/RP1-GIT
ASO CIRCUIT
CN101
PB 5V
REC 12V
REC C
GND
REC Y
ENV
GND
RF SW P
TO VP-1 CN181
DL131 2H COMB FILTER
Q1103 2SC536 AMP
Q1104 2SC536 BUFFER
Q1151 2SA608 BUFFER
Q1105 2SC536 AMP
Q1106 2SC536 BUFFER
Q1102 2SC536 BUFFER
Q1101 2SA608 BUFFER
XF111
B.P.F. 4.43MHz
L.P.F. 1.4MHz
B.P.F. 5.06MHz
IC111 LA7332 CHROMINANCE SIGNAL PROCESS
SUB CONV
HALF H KILLER
REC APC DET
3RD LOCK PROTECT
4.43M XO
4.43M VXO
SIGNAL DET
PB AMP BURST DE KILLER
KILL DET
ID DET
PB APC
REC AFC
PLL LOCK
32 f/FH VCO
PB SLD
R/P DET
BGP BEN
KILLER
MAIN CONV
BURST EMP
ACC AMP
ACC DET
N/P/S DET
Q1052 2SC2839 PHASE COMPENSATION
Q1054 2SC536 BUFFER
Q1501 2SC2839 AMP
Q1502 2SC2839 AMP
D1501, D1502 ... SB0015-03A
B1001 2SC3399 SWITCH
IC101 LA7340 LUMINANCE SIGNAL PROCESS
PIC-CONT
6dB AMP
PB Y/C MIX
SYNC SEP
SYNC AMP
VIDEO AMP 6dB
VIDEO AGC AMP
ATT
AGC DET
FBC
AMP
FM AGC AMP
DOC DET
REC FM LIN
FM MOD
NOISE CANCELL
NL DE-EMPH
LIM
LPF
FM DEMOD
MIX
HPF
DETAIL ENHAN
NL EMPHA
MAIN EMPHA
W.D CLIP
CLAMP
DELAY
DEV
CAR
Q1002 2SC536 AMP
Q1003 2SC536 BUFFER
Q1001 2SA608 BUFFER
IC102 TL8709P CCD 1H-DELAY
Q1031 2SA608 BUFFER
N.CAN
B1201 2SC3399 SWITCH
Q1402 2SA984 SWITCH
Q1401 2SC536 SWITCH
Q1404 2SA1707T SWITCH
Q1403 2SC536 SWITCH
Q1601 2SA608 BUFFER
Q1602 2SA608 BUFFER
Q1631 2SC536 PHASE COMPENSATION
IC161 LA7221 INPUT SELECT SWITCH
Q1651 2SA608 SWITCH
B1651 2SC3399 SWITCH
CN165
VR361 SP
V-LOCK-P
C-SYNC
RF SW P
FSC
V.LOCK ADJ.
TO SV-A
AD IN
AD OUT
AD IN
TO AD-A
VD (CV)
VD (TU)
TO TN-A
ALWAYS 12V
SWD 12V
SWD 5V
GND
TO PW-A
AV CTL(ANT/VD)
AV
ST.SL.-2
PB
REC
DOC.P.
TO SY-A
CN171
B.G.
REC C
PB 5V
PB C
GND
SWD 5V
MESECAM H
PAL H
MESECAM(L)
PAL(L)
TO VD-1
TO CP-1(VD-A)
NOT SPECIFIED DIODES : GMA01 or 1SS133
VOLTAGE REC (PLAY) MODE

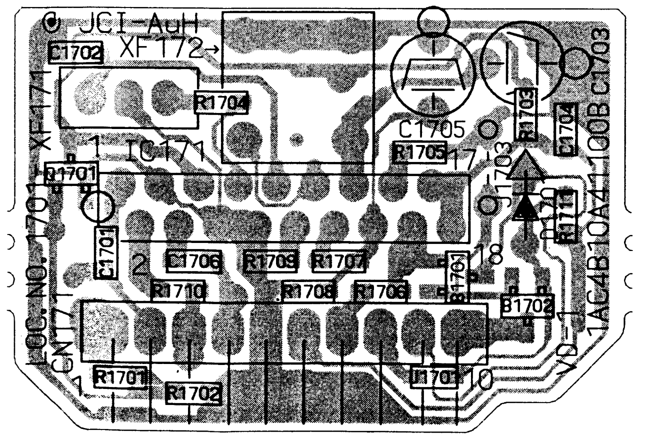
IAGRAM


VD-A
V1-12515/RP1-GIT
Q1502 2SC2839 AMP
Q1601 2SA608 BUFFER
Q1602 2SA608 BUFFER
Q1631 2SC536 PHASE COMPENSATION
IC161 LA7221 INPUT SELECT SWITCH
Q1651 2SA608 SWITCH
B1651 2SC3399 SWITCH
B1001 2SC3399 SWITCH
IC101 LA7340 LUMINANCE SIGNAL PROCESS
Q1402 2SA984 SWITCH
Q1401 2SC536 SWITCH
Q1404 2SA1707T SWITCH
Q1403 2SC536 SWITCH
CN165
V-LOCK-P
C-SYNC
RF SW P
FSC
V.LOCK ADJ.
TO SV-A
AD IN
AD OUT
AD IN
TO AD-A
VD (CV)
VD (TU)
TO TN-A
ALWAYS 12V
SWD 12V
SWD 5V
GND
TO PW-A
AV CTL(ANT/VD)
AV
ST.SL.-2
PB
REC
DOC.P.
TO SY-A
VOLTAGE REC (PLAY) MODE

2-7. VD-1 BOARD PAL/SECAM DISCRIMINATION CIRCUIT DIAGRAM

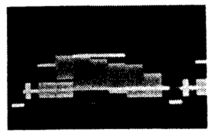
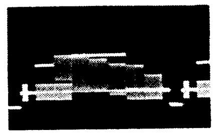
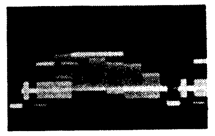
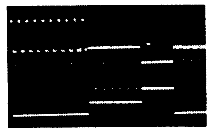
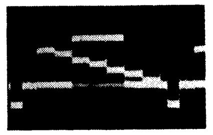
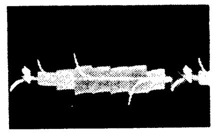
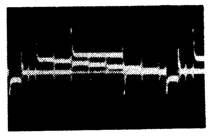
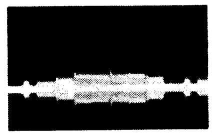
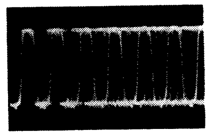
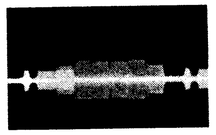
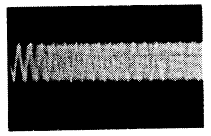
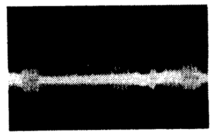
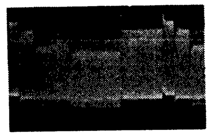
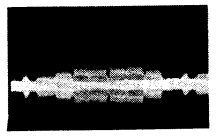
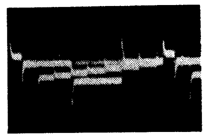
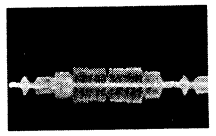
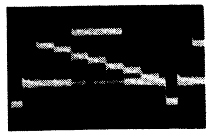
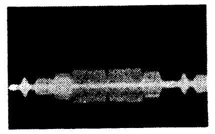
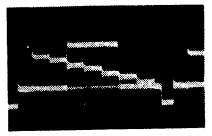
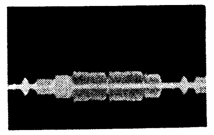
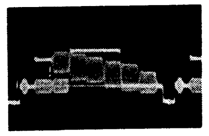
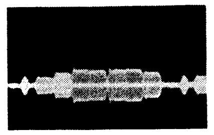

VD-1
V3-12500/RP1-G
CN171
1 B.G.
2 REC C
3 PB 5V
4 PB C
5 GND
6 SWD 5V
7 MESECAM H
8 PAL H
9 MESECAM (L)
10 PAL (L)
TO CP-1(VD-A)
Q1701 2SC2812 B.G.P DET
D1701 GMA01 or 1SS133
B1701 2SC3395 SWITCH
IC171 BA7025L PAL/SECAM DISCRIMINATION
XF171
XF172
C1701 0.01
C1702 100P
C1703 10/16
C1704 0.1
C1705 10/16
C1706 0.01
R1701 22K
R1702 10K
R1703 5.6K
R1704 1K
R1705 22K
R1706 1K
R1707 2.2K
R1708 150K
R1709 430
R1710 22K
R1711 10K
REC.C
SW
DET
COMP 1
COMP 2
REG
PB.C
GND
VOLTAGE : REC(PLAY) MODE

2-8. VD-1 CIRCUIT BOARD

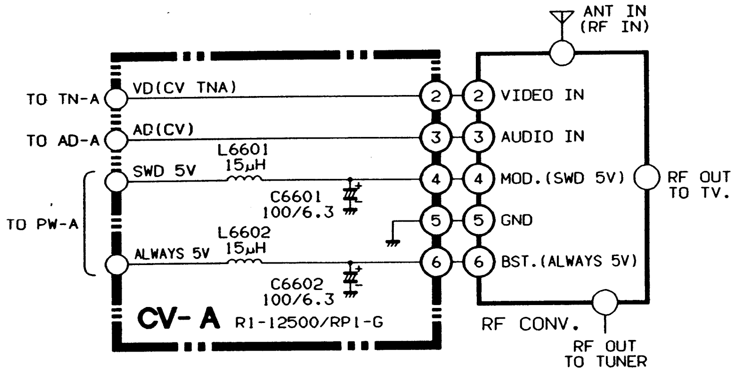

JCI-AuH
XF172
XF171
C1702
R1704
IC171
C1705
R1705
R1703
C1704
C1703
R1701
C1701
C1706
R1709
R1707
R1710
R1708
R1706
B1702
R1702
CN171
R1711
D1701
1AC4B10A4-100B
VD-1

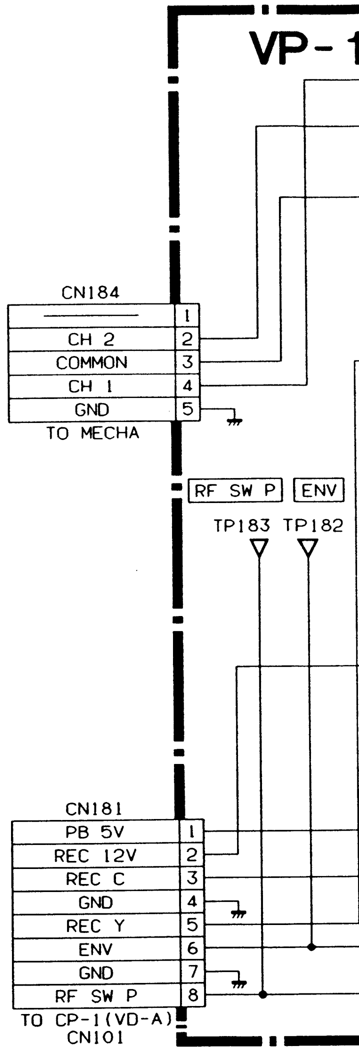
2-9. WAVEFORM OF VIDEO

WF-V5

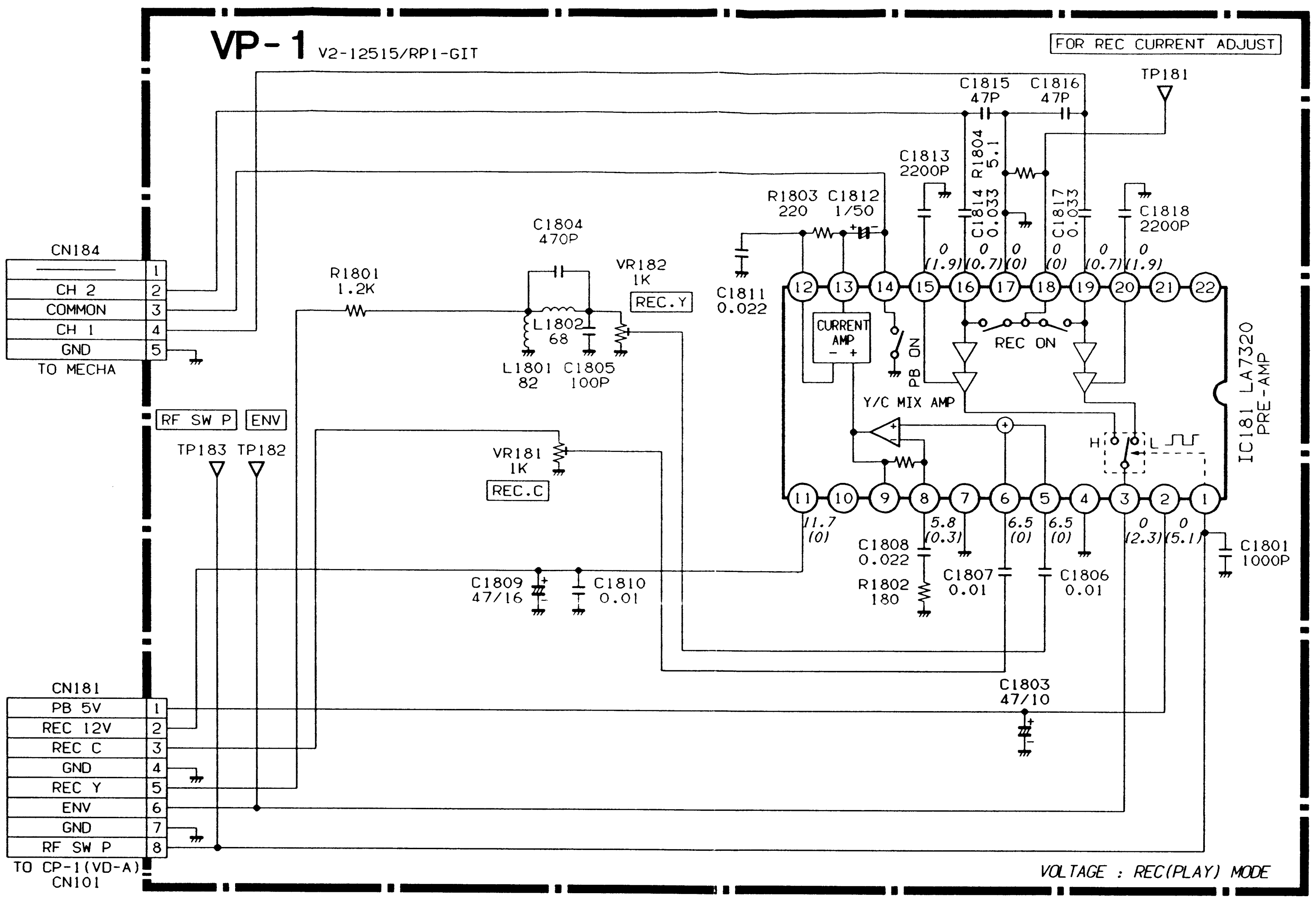
TEST LOCATION	WAVEFORM	MODE/LEVEL	TEST LOCATION	WAVEFORM	MODE/LEVEL
IC101 Pin 24		REC, EE 1 Vp-p	IC101 Pin 21		REC, EE 2 Vp-p
IC101 Pin 7		REC, EE 1 Vp-p	IC101 (UPPER) Pin 21 (LOWER) Pin 20		STILL (UPPER) 2 Vp-p (LOWER) 5 Vp-p
IC101 Pin 6		REC, EE 0.45 Vp-p	IC111 Pin 21		REC, EE 1 Vp-p
IC101 Pin 2		REC, EE 1.3 Vp-p	IC111 Pin 3		REC, EE 0.14 Vp-p
IC101 Pin 30		REC, EE 1.5 Vp-p	IC111 Pin 9		REC, EE 0.8Vp-p
IC101 Pin 26		PB 0.3 Vp-p	Q1105 Base		PB 0.1 Vp-p
IC101 Pin 7		PB 2.0 Vp-p	Q1106 Emitter		PB 0.8 Vp-p
Q1002 Base		PB 0.5 Vp-p	IC111 Pin 7		PB 0.3 Vp-p
IC101 Pin 9		PB 0.6 Vp-p	IC111 Pin 5		PB 1.2 Vp-p
IC101 Pins 10/12		PB 0.5 Vp-p	IC111 Pin 24		PB 0.24 Vp-p
IC101 Pin 21		PB 2 Vp-p	IC111 Pin 23		PB 0.7 Vp-p

2-10. CP-1 BOARD (CV-A) RF CONVERTER CONNECTION CIRCUIT DIAGRAM

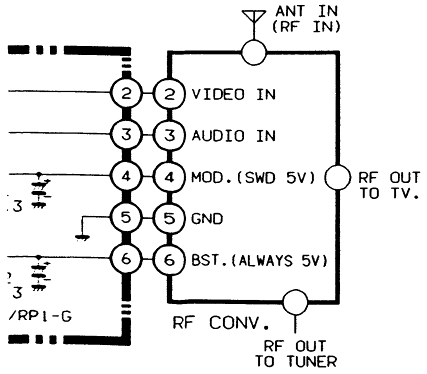

ANT IN
(RF IN)
TO TN-A
TO AD-A
TO PW-A
VD(CV TNA)
AD(CV)
SWD 5V
ALWAYS 5V
L6601
15μH
L6602
15μH
C6601
100/6.3
C6602
100/6.3
CV-A
R1-12500/RP1-G
2
3
4
5
6
VIDEO IN
AUDIO IN
MOD.(SWD 5V)
GND
BST.(ALWAYS 5V)
RF OUT
TO TV.
RF CONV.
RF OUT
TO TUNER


VP-1
CN184
CH 2
COMMON
CH 1
GND
TO MECHA
1
2
3
4
5
RF SW P
ENV
TP183
TP182
CN181
PB 5V
REC 12V
REC C
GND
REC Y
ENV
GND
RF SW P
1
2
3
4
5
6
7
8
TO CP-1(VD-A)
CN101

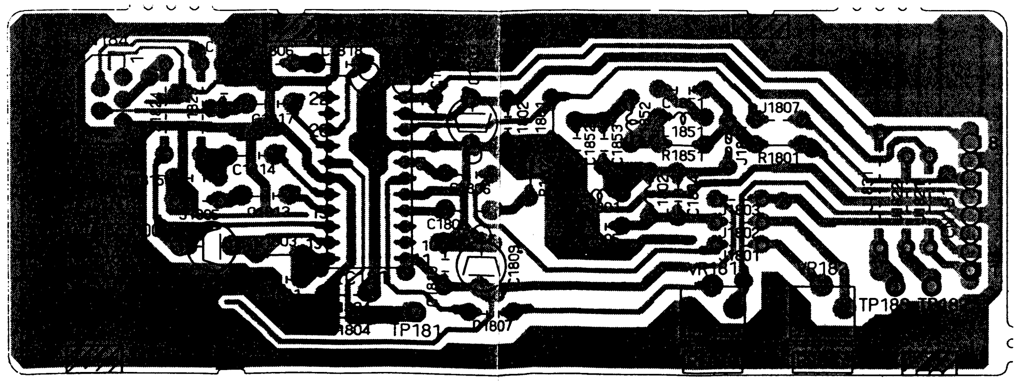
2-11. VP-1 BOARD VIDEO PRE-AMP CIRCUIT DIAGRAM


VP-1 V2-12515/RP1-GIT
FOR REC CURRENT ADJUST
TP181
C1815 47P
C1816 47P
R1804 5.1
C1813 2200P
C1814 0.033
C1817 0.033
C1818 2200P
R1803 220
C1812 1/50
C1804 470P
VR182 1K
REC.Y
R1801 1.2K
C1811 0.022
L1802 68
L1801 82
C1805 100P
CN184
CH 2
COMMON
CH 1
GND
TO MECHA
CURRENT AMP
PB ON
REC ON
Y/C MIX AMP
IC181 LA7320 PRE-AMP
H
L
RF SW P
ENV
TP183
TP182
VR181 1K
REC.C
C1809 47/16
C1810 0.01
C1808 0.022
R1802 180
C1807 0.01
C1806 0.01
C1801 1000P
C1803 47/10
CN181
PB 5V
REC 12V
REC C
GND
REC Y
ENV
GND
RF SW P
TO CP-1(VD-A) CN101
VOLTAGE : REC(PLAY) MODE

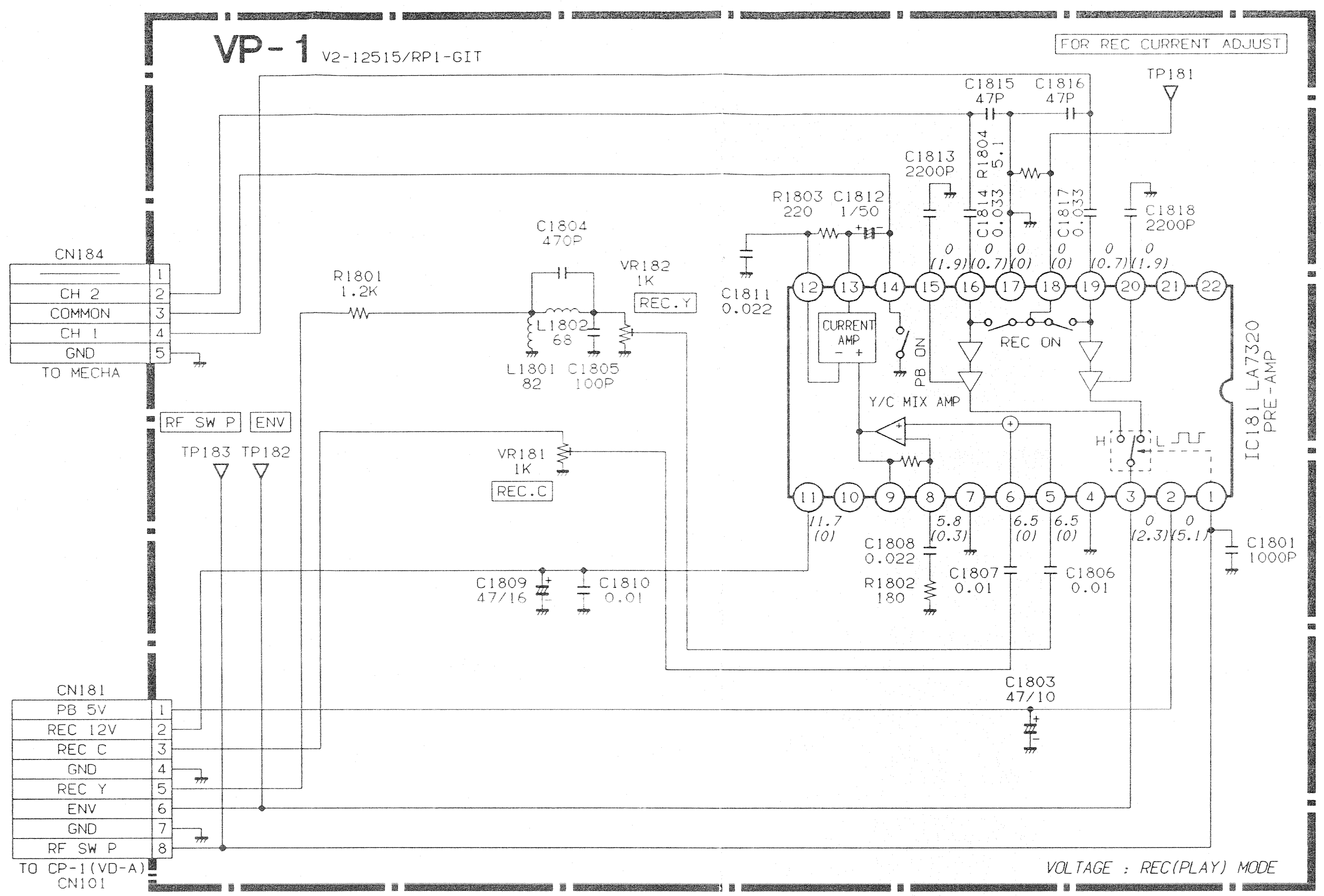
A) RF CONVERTER
CUIT DIAGRAM


ANT IN (RF IN)
VIDEO IN
AUDIO IN
MOD.(SWD 5V)
GND
BST.(ALWAYS 5V)
RF OUT TO TV.
RF CONV.
RF OUT TO TUNER
/RP1-G

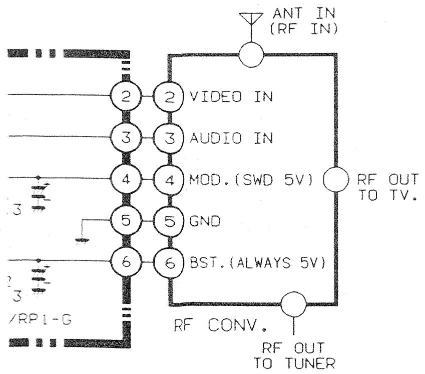
2-12. VP-1 CIRCUIT BOARD


TP181
TP183
TP182
R1801
R1804

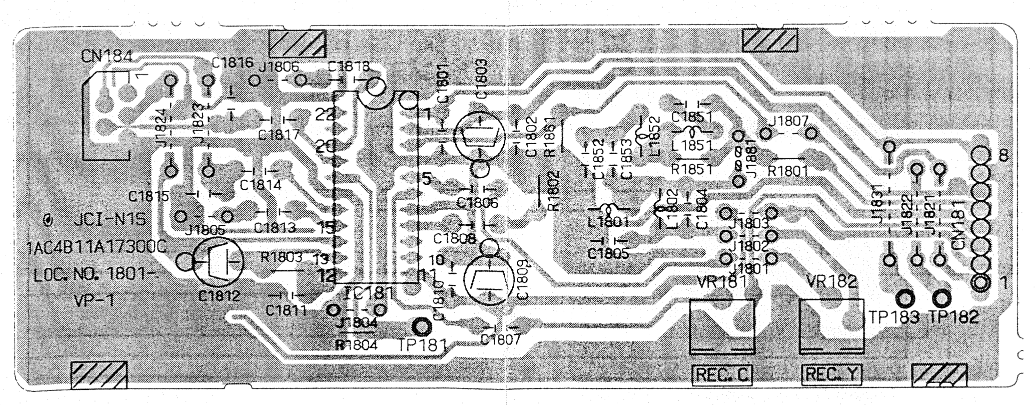
2-11. VP-1 BOARD VIDEO PRE-AMP CIRCUIT DIAGRAM


VP-1 V2-12515/RP1-GIT
FOR REC CURRENT ADJUST
TP181
C1815 47P
C1816 47P
C1813 2200P
R1804 5.1
R1803 220
C1812 1/50
C1814 0.033
C1817 0.033
C1818 2200P
C1804 470P
VR182 1K
REC.Y
R1801 1.2K
L1802 68
L1801 82
C1805 100P
C1811 0.022
CURRENT AMP
PB ON
REC ON
Y/C MIX AMP
IC181 LA7320 PRE-AMP
CN184
CH 2
COMMON
CH 1
GND
TO MECHA
RF SW P
ENV
TP183
TP182
VR181 1K
REC.C
C1808 0.022
R1802 180
C1807 0.01
C1806 0.01
C1801 1000P
C1809 47/16
C1810 0.01
C1803 47/10
CN181
PB 5V
REC 12V
REC C
GND
REC Y
ENV
GND
RF SW P
TO CP-1(VD-A) CN101
VOLTAGE : REC(PLAY) MODE

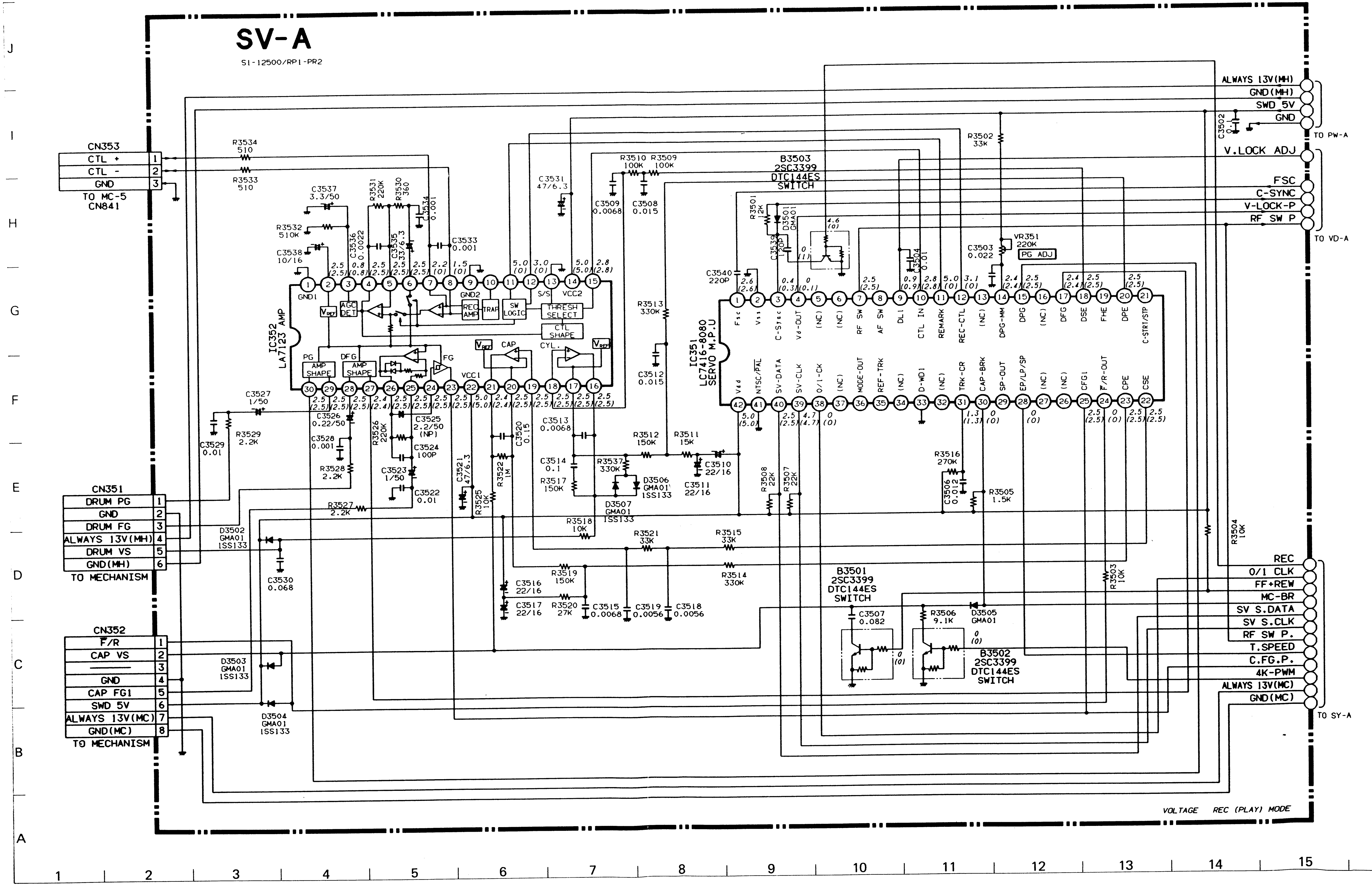
A) RF CONVERTER
CUIT DIAGRAM


ANT IN (RF IN)
VIDEO IN
AUDIO IN
MOD. (SWD 5V)
GND
BST. (ALWAYS 5V)
RF OUT TO TV.
RF CONV.
RF OUT TO TUNER
/RP1-G

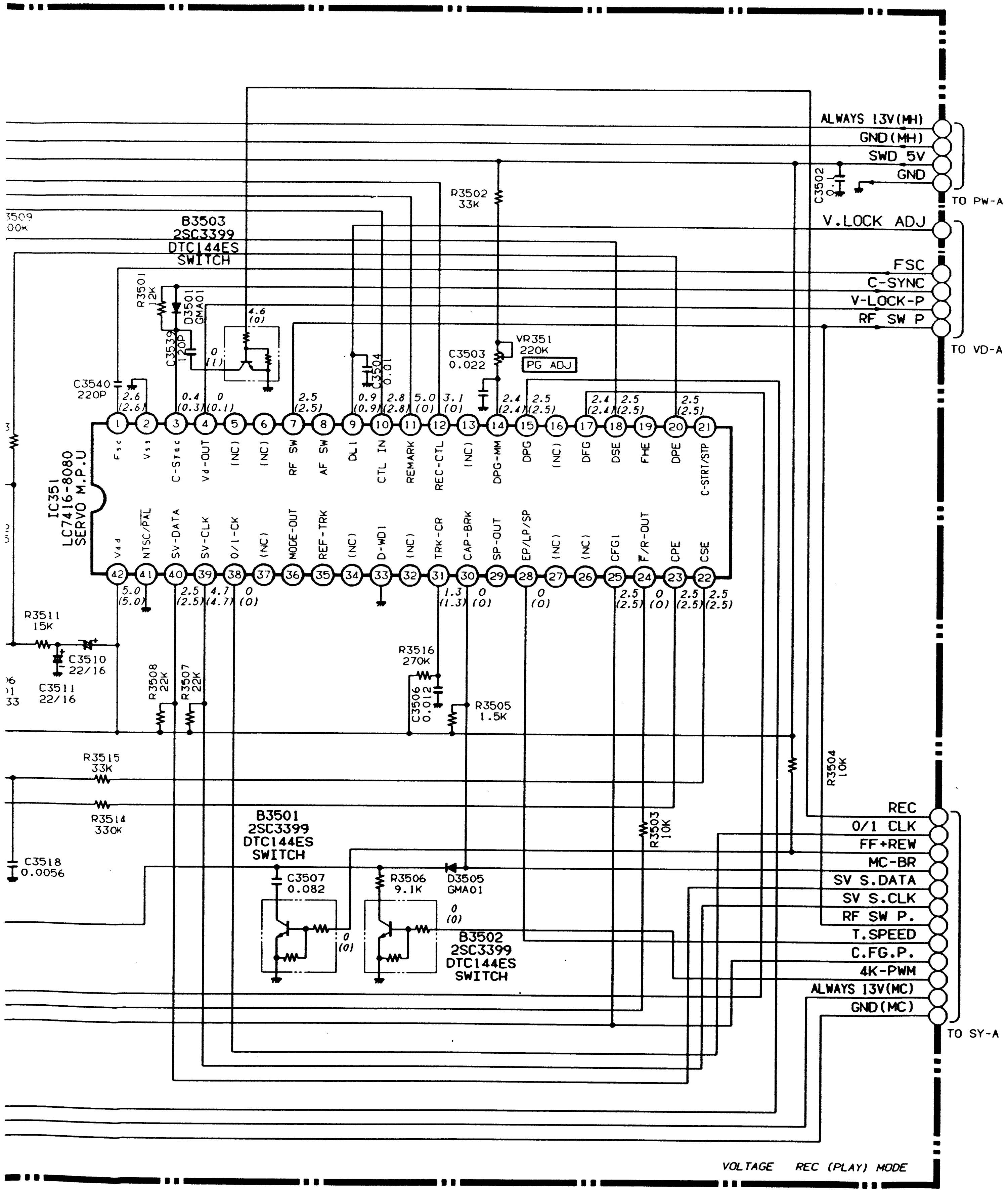
2-12. VP-1 CIRCUIT BOARD


CN184
C1816
J1806
C1818
C1817
C1814
C1815
J1805
C1813
JCI-N1S
1AC4B11A17300C
LOC. NO. 1801-
VP-1
R1803
C1812
C1811
IC181
J1804
R1804
TP181
C1801
C1803
C1802
R1851
R1802
C1806
C1808
C1809
C1807
C1852
C1853
L1852
C1851
L1851
R1851
J1807
J1881
R1801
L1801
C1805
C1804
J1803
J1802
J1801
VR181
VR182
J1821
J1822
CN181
TP183
TP182
REC.C
REC.Y

2-15. CP-1 BOARD (SV-A) SERVO CIRCUIT DIAGRAM

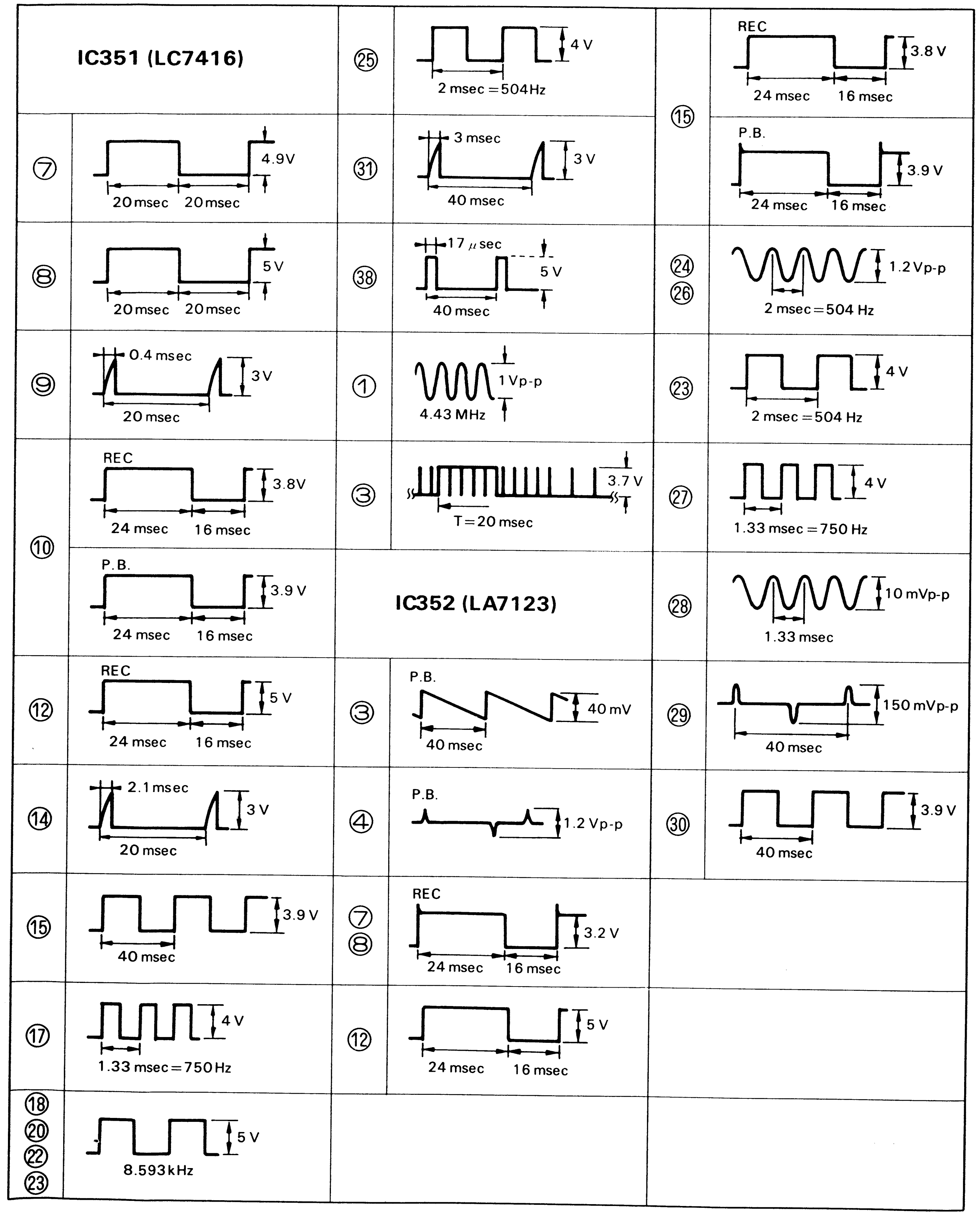

SV-A
S1-12500/RP1-PR2
CN353
CTL +
CTL -
GND
TO MC-5 CN841
R3534 510
R3533 510
CN351
DRUM PG
GND
DRUM FG
ALWAYS 13V(MH)
DRUM VS
GND(MH)
TO MECHANISM
CN352
F/R
CAP VS
GND
CAP FG1
SWD 5V
ALWAYS 13V(MC)
GND(MC)
TO MECHANISM
D3502 GMA01 1SS133
D3503 GMA01 1SS133
D3504 GMA01 1SS133
C3530 0.068
C3529 0.01
R3529 2.2K
C3527 1/50
R3527 2.2K
C3526 0.22/50
C3528 0.001
R3528 2.2K
R3526 220K
C3523 1/50
C3522 0.01
C3525 2.2/50 (NP)
C3524 100P
C3537 3.3/50
R3532 510K
C3538 10/16
C3536 0.0022
R3531 220K
R3530 360
C3535 33/6.3
C3534 0.001
C3533 0.001
IC352 LA7123 AMP
GND1
VREF
AGC DET
REC AMP
TRAP
SW LOGIC
THRESH SELECT
CTL SHAPE
S/S
VCC2
GND2
PG
DFG
AMP SHAPE
FG
CAP
CYL.
VCC1
C3521 47/6.3
R3525 10K
R3522 1M
C3520 0.15
C3516 22/16
C3517 22/16
R3519 150K
R3520 27K
C3515 0.0068
C3519 0.0056
C3518 0.0056
R3518 10K
R3521 33K
R3515 33K
R3514 330K
C3531 47/6.3
C3509 0.0068
C3508 0.015
R3510 100K
R3509 100K
R3513 330K
C3512 0.015
C3513 0.0068
C3514 0.1
R3517 150K
R3537 330K
D3506 GMA01 1SS133
D3507 GMA01 1SS133
R3512 150K
R3511 15K
C3510 22/16
C3511 22/16
R3508 22K
R3507 22K
B3503 2SC3399 DTC144ES SWITCH
R3501 2K
D3501 GMA01
C3539 120P
C3540 220P
C3504 0.01
C3503 0.022
VR351 220K
PG ADJ
R3502 33K
C3502 0.1
IC351 LC7416-8080 SERVO M.P.U
Fsc
Vss
C-Sync
Vd-OUT
(NC)
RF SW
AF SW
DL1
CTL IN
REMARK
REC-CTL
DPG-MM
DPG
DFG
DSE
FHE
DPE
C-STRT/STP
Vdd
NTSC/PAL
SV-DATA
SV-CLK
0/1-CK
MODE-OUT
REF-TRK
D-WD1
TRK-CR
CAP-BRK
SP-OUT
EP/LP/SP
CFG1
F/R-OUT
CPE
CSE
R3516 270K
C3506 0.012
R3505 1.5K
R3504 10K
R3503 10K
B3501 2SC3399 DTC144ES SWITCH
C3507 0.082
R3506 9.1K
D3505 GMA01
B3502 2SC3399 DTC144ES SWITCH
ALWAYS 13V(MH)
GND(MH)
SWD 5V
GND
TO PW-A
V.LOCK ADJ
FSC
C-SYNC
V-LOCK-P
RF SW P
TO VD-A
REC
0/1 CLK
FF+REW
MC-BR
SV S.DATA
SV S.CLK
RF SW P.
T.SPEED
C.FG.P.
4K-PWM
ALWAYS 13V(MC)
GND(MC)
TO SY-A
VOLTAGE REC (PLAY) MODE
A
B
C
D
E
F
G
H
I
J
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

-A) SERVO CIRCUIT DIAGRAM

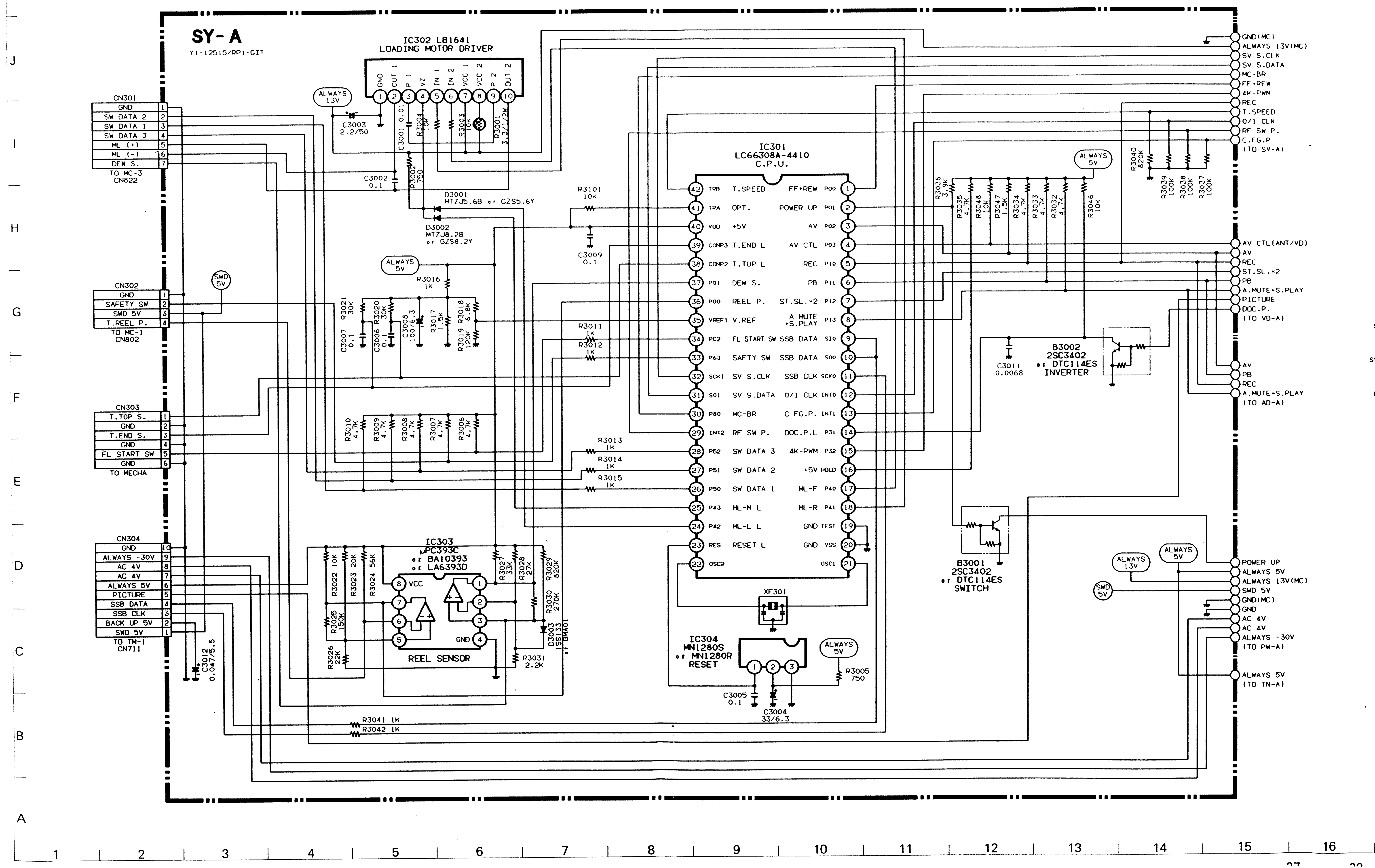

ALWAYS 13V(MH)
GND(MH)
SWD 5V
GND
TO PW-A
V.LOCK ADJ
FSC
C-SYNC
V-LOCK-P
RF SW P
TO VD-A
C3502 0.1
R3502 33K
3509 00K
B3503 2SC3399 DTC144ES SWITCH
R3501 12K
D3501 GMA01
C3539 120P
C3540 220P
4.6 (0)
0 (1)
C3504 0.01
C3503 0.022
VR351 220K
PG ADJ
2.6 (2.6)
0.4 (0.3)
0 (0.1)
2.5 (2.5)
0.9 (0.9)
2.8 (2.8)
5.0 (0)
3.1 (0)
2.4 (2.4)
2.5 (2.5)
2.4 (2.4)
2.5 (2.5)
2.5 (2.5)
IC351 LC7416-8080 SERVO M.P.U
1 Fsc
2 Vss
3 C-Sync
4 Vd-OUT
5 (NC)
6 (NC)
7 RF SW
8 AF SW
9 DLI
10 CTL IN
11 REMARK
12 REC-CTL
13 (NC)
14 DPG-MM
15 DPG
16 (NC)
17 DFG
18 DSE
19 FHE
20 DPE
21 C-STRT/STP
42 Vdd
41 NTSC/PAL
40 SV-DATA
39 SV-CLK
38 0/1-CK
37 (NC)
36 MODE-OUT
35 REF-TRK
34 (NC)
33 D-WDI
32 (NC)
31 TRK-CR
30 CAP-BRK
29 SP-OUT
28 EP/LP/SP
27 (NC)
26 (NC)
25 CFGI
24 F/R-OUT
23 CPE
22 CSE
5.0 (5.0)
2.5 (2.5)
4.7 (4.7)
0 (0)
1.3 (1.3)
0 (0)
0 (0)
2.5 (2.5)
0 (0)
2.5 (2.5)
2.5 (2.5)
R3511 15K
C3510 22/16
C3511 22/16
R3508 22K
R3507 22K
R3516 270K
C3506 0.012
R3505 1.5K
R3504 10K
R3515 33K
R3514 330K
C3518 0.0056
B3501 2SC3399 DTC144ES SWITCH
C3507 0.082
R3506 9.1K
D3505 GMA01
0 (0)
0 (0)
B3502 2SC3399 DTC144ES SWITCH
R3503 10K
REC
0/1 CLK
FF+REW
MC-BR
SV S.DATA
SV S.CLK
RF SW P.
T.SPEED
C.FG.P.
4K-PWM
ALWAYS 13V(MC)
GND(MC)
TO SY-A
VOLTAGE REC (PLAY) MODE

2-16. WAVEFORM OF SERVO

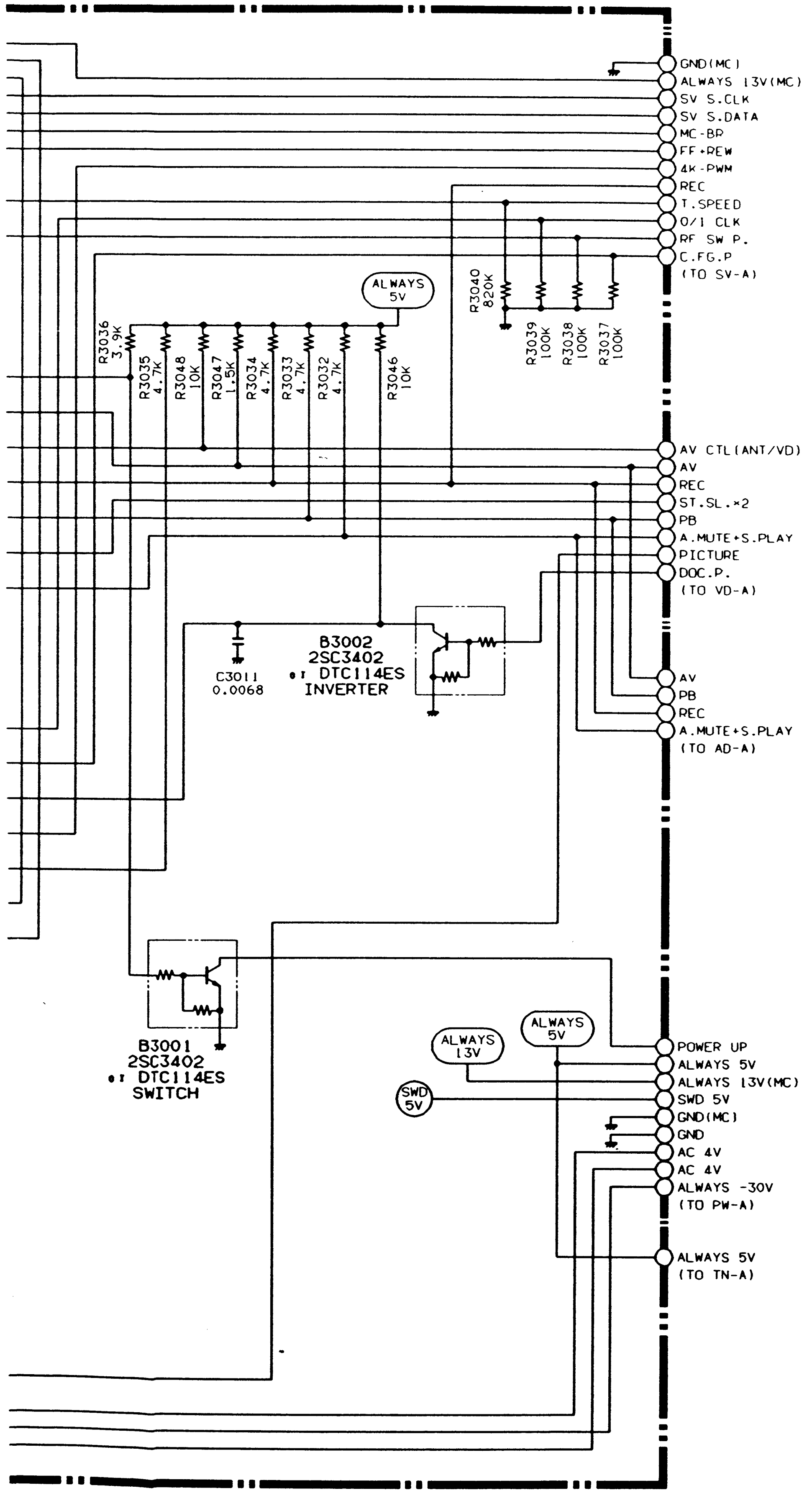
WF-S1


IC351 (LC7416)
⑦ 4.9V 20msec 20msec
⑧ 5V 20msec 20msec
⑨ 0.4 msec 3V 20 msec
⑩ REC 3.8V 24 msec 16 msec
P.B. 3.9V 24 msec 16 msec
⑫ REC 5V 24 msec 16 msec
⑭ 2.1 msec 3V 20 msec
⑮ 3.9V 40 msec
⑰ 4V 1.33 msec = 750 Hz
⑱ ⑳ ㉒ ㉓ 5V 8.593kHz
㉕ 4V 2 msec = 504Hz
㉛ 3 msec 3V 40 msec
㊳ 17 μsec 5V 40 msec
① 1Vp-p 4.43 MHz
③ 3.7V T = 20 msec
IC352 (LA7123)
③ P.B. 40 mV 40 msec
④ P.B. 1.2 Vp-p
⑦ ⑧ REC 3.2V 24 msec 16 msec
⑫ 5V 24 msec 16 msec
⑮ REC 3.8V 24 msec 16 msec
P.B. 3.9V 24 msec 16 msec
㉔ ㉖ 1.2Vp-p 2 msec = 504 Hz
㉓ 4V 2 msec = 504 Hz
㉗ 4V 1.33 msec = 750 Hz
㉘ 10 mVp-p 1.33 msec
㉙ 150 mVp-p 40 msec
㉚ 3.9V 40 msec

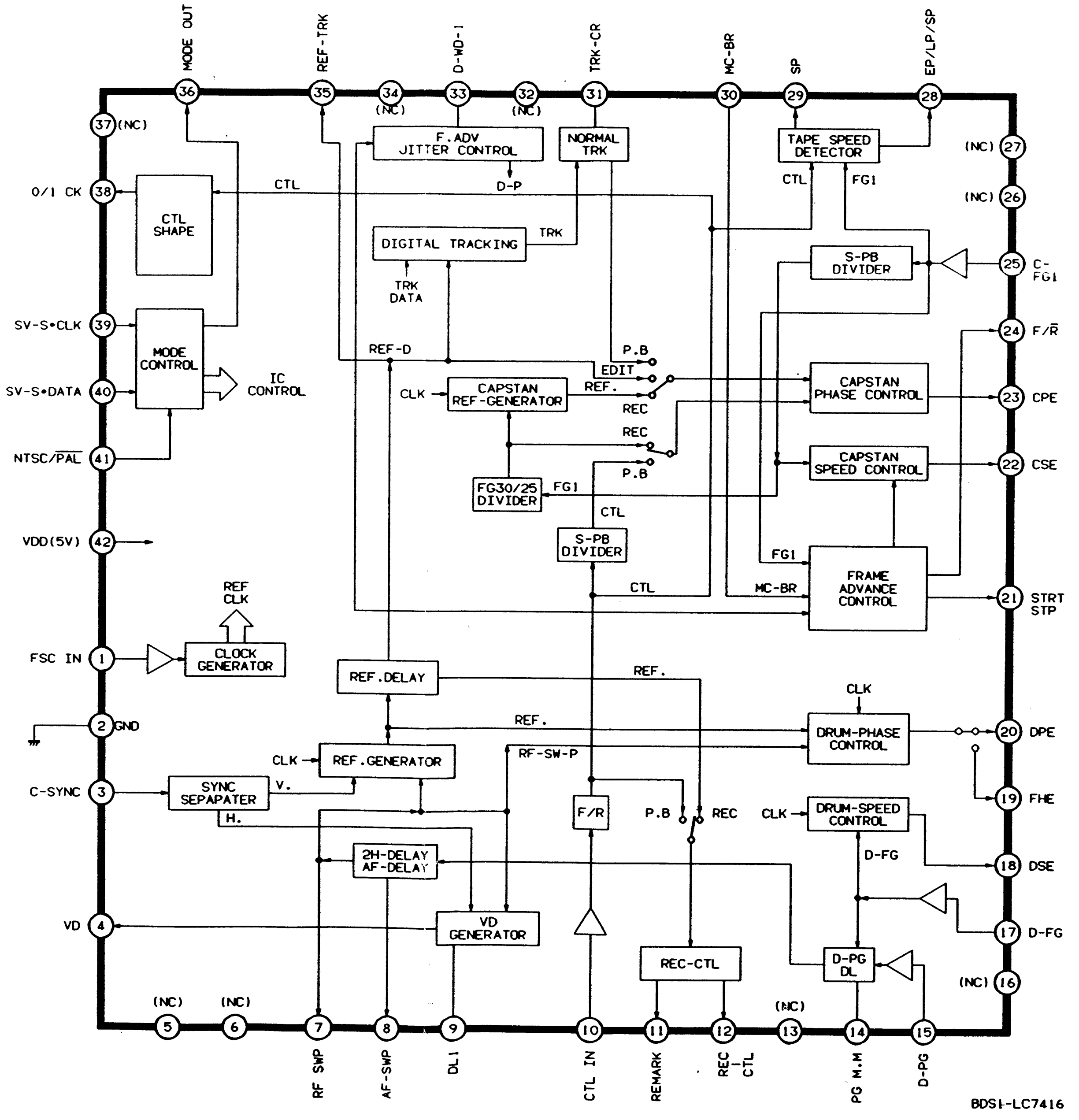
2-13. CP-1 BOARD (SY-A) SYSTEM CONTROL CIRCUIT DIAGRAM


SY-A
Y1-12515/RP1-GIT
IC302 LB1641
LOADING MOTOR DRIVER
GND
OUT 1
P 1
VZ
IN 1
IN 2
VCC 1
VCC 2
P 2
OUT 2
ALWAYS 13V
C3003 2.2/50
C3001 0.01
R3004 10K
R3003 10K
R3001 3.3/1/2W
C3002 0.1
R3002 750
D3001 MTZJ5.6B or GZS5.6Y
D3002 MTZJ8.2B or GZS8.2Y
CN301
GND
SW DATA 2
SW DATA 1
SW DATA 3
ML (+)
ML (-)
DEW S.
TO MC-3 CN822
CN302
GND
SAFETY SW
SWD 5V
T.REEL P.
TO MC-1 CN802
SWD 5V
CN303
T.TOP S.
GND
T.END S.
GND
FL START SW
GND
TO MECHA
CN304
GND
ALWAYS -30V
AC 4V
AC 4V
ALWAYS 5V
PICTURE
SSB DATA
SSB CLK
BACK UP 5V
SWD 5V
TO TM-1 CN711
C3012 0.047/5.5
ALWAYS 5V
R3016 1K
R3021 30K
R3020 30K
C3007 0.1
C3006 0.1
C3008 100/6.3
R3017 1.5K
R3018 6.8K
R3019 120K
R3010 4.7K
R3009 4.7K
R3008 4.7K
R3007 4.7K
R3006 4.7K
IC303
μPC393C or BA10393 or LA6393D
REEL SENSOR
VCC
GND
R3022 10K
R3023 20K
R3024 56K
R3025 150K
R3026 22K
R3027 33K
R3028 27K
R3029 820K
R3030 270K
R3031 2.2K
D3003 1SS133 or UMA01
R3041 1K
R3042 1K
R3101 10K
C3009 0.1
R3011 1K
R3012 1K
R3013 1K
R3014 1K
R3015 1K
IC301
LC66308A-4410
C.P.U.
42 TRB T.SPEED
41 TRA OPT.
40 VDD +5V
39 COMP3 T.END L
38 COMP2 T.TOP L
37 P01 DEW S.
36 P00 REEL P.
35 VREF1 V.REF
34 PC2 FL START SW
33 P63 SAFTY SW
32 SCK1 SV S.CLK
31 S01 SV S.DATA
30 P80 MC-BR
29 INT2 RF SW P.
28 P52 SW DATA 3
27 P51 SW DATA 2
26 P50 SW DATA 1
25 P43 ML-M L
24 P42 ML-L L
23 RES RESET L
22 OSC2
1 P00 FF+REW
2 P01 POWER UP
3 P02 AV
4 P03 AV CTL
5 P10 REC
6 P11 PB
7 P12 ST.SL.×2
8 P13 A MUTE +S.PLAY
9 SI0 SSB DATA
10 SO0 SSB DATA
11 SCK0 SSB CLK
12 INT0 0/1 CLK
13 INT1 C FG.P.
14 P31 DOC.P.L
15 P32 4K-PWM
16 HOLD +5V
17 P40 ML-F
18 P41 ML-R
19 TEST GND
20 VSS GND
21 OSC1
XF301
IC304
MN1280S or MN1280R
RESET
ALWAYS 5V
R3005 750
C3005 0.1
C3004 33/6.3
ALWAYS 5V
R3036 3.9K
R3035 4.7K
R3048 10K
R3047 1.5K
R3034 4.7K
R3033 4.7K
R3032 4.7K
R3046 10K
R3040 820K
R3039 100K
R3038 100K
R3037 100K
C3011 0.0068
B3002
2SC3402
or DTC114ES
INVERTER
B3001
2SC3402
or DTC114ES
SWITCH
ALWAYS 13V
ALWAYS 5V
SWD 5V
GND(MC)
ALWAYS 13V(MC)
SV S.CLK
SV S.DATA
MC-BR
FF+REW
4K-PWM
REC
T.SPEED
0/1 CLK
RF SW P.
C.FG.P
(TO SV-A)
AV CTL(ANT/VD)
AV
REC
ST.SL.×2
PB
A.MUTE+S.PLAY
PICTURE
DOC.P.
(TO VD-A)
AV
PB
REC
A.MUTE+S.PLAY
(TO AD-A)
POWER UP
ALWAYS 5V
ALWAYS 13V(MC)
SWD 5V
GND(MC)
GND
AC 4V
AC 4V
ALWAYS -30V
(TO PW-A)
ALWAYS 5V
(TO TN-A)
K
J
I
H
G
F
E
D
C
B
A
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

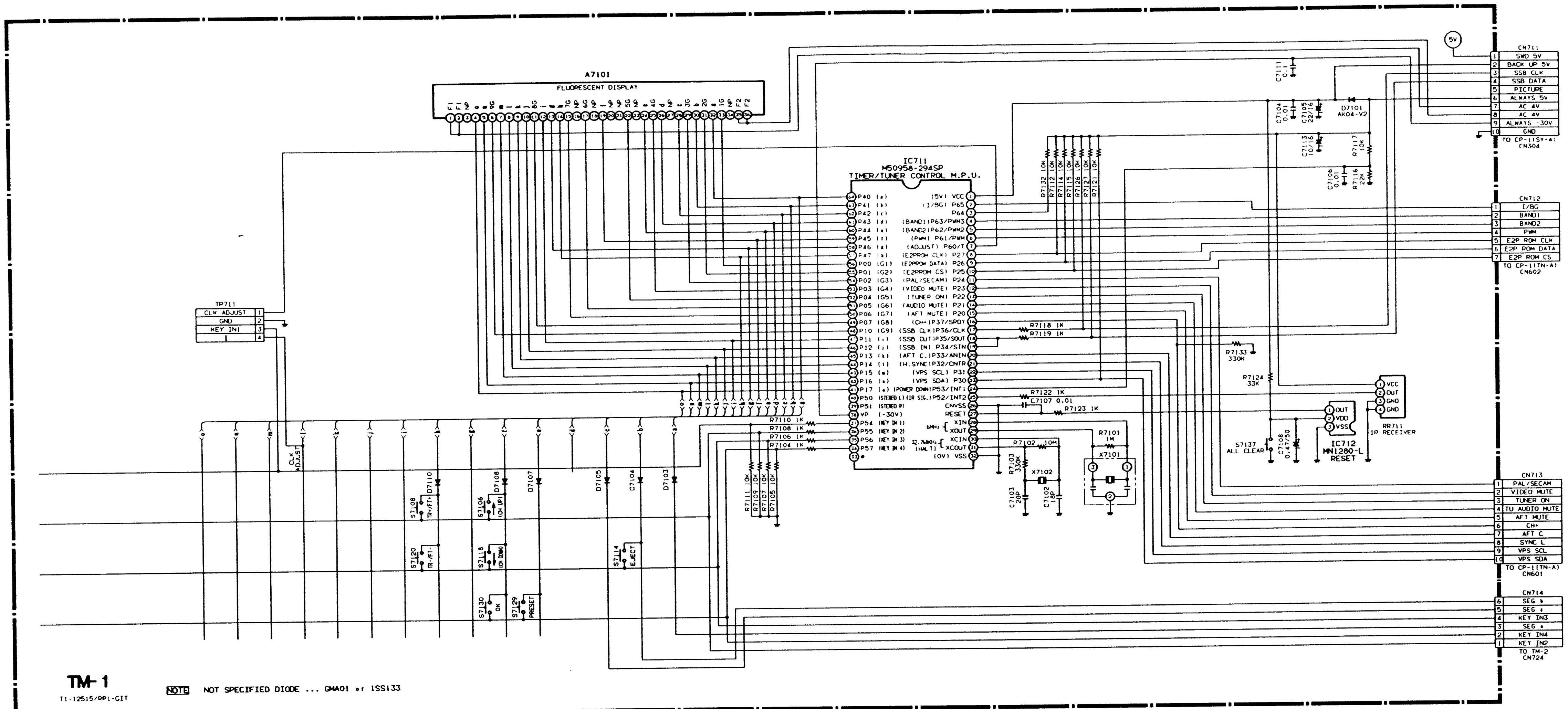
M


GND(MC)
ALWAYS 13V(MC)
SV S.CLK
SV S.DATA
MC-BR
FF•REW
4K-PWM
REC
T.SPEED
O/1 CLK
RF SW P.
C.FG.P
(TO SV-A)
ALWAYS 5V
R3040 820K
R3039 100K
R3038 100K
R3037 100K
R3036 3.9K
R3035 4.7K
R3048 10K
R3047 1.5K
R3034 4.7K
R3033 4.7K
R3032 4.7K
R3046 10K
AV CTL(ANT/VD)
AV
REC
ST.SL.×2
PB
A.MUTE•S.PLAY
PICTURE
DOC.P.
(TO VD-A)
B3002
2SC3402
or DTC114ES
INVERTER
C3011
0.0068
AV
PB
REC
A.MUTE•S.PLAY
(TO AD-A)
B3001
2SC3402
or DTC114ES
SWITCH
ALWAYS 13V
ALWAYS 5V
SWD 5V
POWER UP
ALWAYS 5V
ALWAYS 13V(MC)
SWD 5V
GND(MC)
GND
AC 4V
AC 4V
ALWAYS -30V
(TO PW-A)
ALWAYS 5V
(TO TN-A)

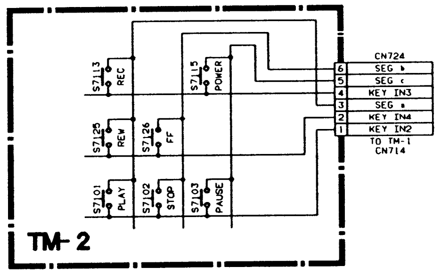
2-14. IC351 (LC7416) DIGITAL SERVO IC INTER BLOCK DIAGRAM


MODE OUT
REF-TRK
D-WD-1
TRK-CR
MC-BR
SP
EP/LP/SP
36
35
34 (NC)
33
32 (NC)
31
30
29
28
37 (NC)
O/1 CK 38
SV-S•CLK 39
SV-S•DATA 40
NTSC/PAL 41
VDD(5V) 42
FSC IN 1
2 GND
C-SYNC 3
VD 4
(NC) 27
(NC) 26
25 C-FG1
24 F/R
23 CPE
22 CSE
21 STRT STP
20 DPE
19 FHE
18 DSE
17 D-FG
(NC) 16
(NC) 5
(NC) 6
7 RF SWP
8 AF-SWP
9 DL1
10 CTL IN
11 REMARK
12 REC CTL
(NC) 13
14 PG M.M
15 D-PG
F.ADV JITTER CONTROL
D-P
NORMAL TRK
TAPE SPEED DETECTOR
CTL
FG1
CTL SHAPE
CTL
DIGITAL TRACKING
TRK
TRK DATA
S-PB DIVIDER
MODE CONTROL
IC CONTROL
REF-D
P.B
EDIT
REF.
CLK
CAPSTAN REF-GENERATOR
REC
REC
P.B
CAPSTAN PHASE CONTROL
CAPSTAN SPEED CONTROL
FG30/25 DIVIDER
FG1
CTL
S-PB DIVIDER
FG1
MC-BR
CTL
FRAME ADVANCE CONTROL
REF CLK
CLOCK GENERATOR
REF.DELAY
REF.
CLK
REF.
DRUM-PHASE CONTROL
CLK
REF.GENERATOR
RF-SW-P
SYNC SEPAPATER
V.
H.
F/R
P.B
REC
CLK
DRUM-SPEED CONTROL
D-FG
2H-DELAY AF-DELAY
VD GENERATOR
REC-CTL
D-PG DL
BDSI-LC7416

2-17. TM-1,2 BOARD DISPLAY, TIMER, TUNING CONTROL & SWITCH CIRCUIT DIAGRAM


A7101
FLUORESCENT DISPLAY
IC711
M50958-294SP
TIMER/TUNER CONTROL M.P.U.
P40 (a)
P41 (b)
P42 (c)
P43 (d)
P44 (e)
P45 (f)
P46 (g)
P47 (h)
P00 (G1)
P01 (G2)
P02 (G3)
P03 (G4)
P04 (G5)
P05 (G6)
P06 (G7)
P07 (G8)
P10 (G9)
P11 (i)
P12 (j)
P13 (k)
P14 (l)
P15 (m)
P16 (n)
P17 (o)
P50 (STEREO L)
P51 (STEREO R)
VP (-30V)
P54 (KEY IN 1)
P55 (KEY IN 2)
P56 (KEY IN 3)
P57 (KEY IN 4)
(5V) VCC
(I/BG) P65
P64
(BAND1) P63/PWM3
(BAND2) P62/PWM2
(PWM) P61/PWM
(ADJUST) P60/T
(E2PROM CLK) P27
(E2PROM DATA) P26
(E2PROM CS) P25
(PAL/SECAM) P24
(VIDEO MUTE) P23
(TUNER ON) P22
(AUDIO MUTE) P21
(AFT MUTE) P20
(CH+) P37/SRDY
(SSB CLK) P36/CLK
(SSB OUT) P35/SOUT
(SSB IN) P34/SIN
(AFT C.) P33/ANIN
(H.SYNC) P32/CNTR
(VPS SCL) P31
(VPS SDA) P30
(POWER DOWN) P53/INT1
(IR SIG.) P52/INT2
CNVSS
RESET
6MHz XIN
XOUT
32.768KHz (HALT) XCIN
XCOUT
(0V) VSS
5V
CN711
SWD 5V
BACK UP 5V
SSB CLK
SSB DATA
PICTURE
ALWAYS 5V
AC 4V
AC 4V
ALWAYS -30V
GND
TO CP-1(SY-A) CN304
CN712
I/BG
BAND1
BAND2
PWM
E2P ROM CLK
E2P ROM DATA
E2P ROM CS
TO CP-1(TN-A) CN602
CN713
PAL/SECAM
VIDEO MUTE
TUNER ON
TU AUDIO MUTE
AFT MUTE
CH+
AFT C
SYNC L
VPS SCL
VPS SDA
TO CP-1(TN-A) CN601
CN714
SEG b
SEG c
KEY IN3
SEG a
KEY IN4
KEY IN2
TO TM-2 CN724
C7111 0.1
C7104 0.01
C7105 22/16
D7101 AK04-V2
C7113 10/16
R7117 10K
C7106 0.01
R7116 22K
R7132 10K
R7112 10K
R7114 10K
R7115 10K
R7126 10K
R7127 10K
R7121 10K
R7118 1K
R7119 1K
R7133 330K
R7124 33K
R7122 1K
C7107 0.01
R7123 1K
R7102 10M
R7103 330K
C7103 20P
X7102
C7102 18P
R7101 1M
X7101
S7137 ALL CLEAR
C7108 0.47/50
IC712 MN1280-L RESET
OUT
VDD
VSS
VCC
OUT
GND
GND
RR711 IR RECEIVER
TP711
CLK ADJUST
GND
KEY IN1
CLK ADJUST
R7110 1K
R7108 1K
R7106 1K
R7104 1K
R7111 10K
R7109 10K
R7107 10K
R7105 10K
D7110
D7108
D7107
D7105
D7104
D7103
S7108 TR+/FT+
S7106 (CH UP)
S7120 TR-/FT-
S7118 (CH DOWN)
S7114 EJECT
S7130 OK
S7129 PRESET
TM-1
T1-12515/RP1-GIT

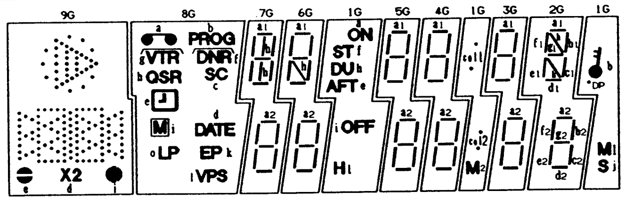
NOTE NOT SPECIFIED DIODE ... GMA01 or 1SS133


CN724
SEG b
SEG c
KEY IN3
SEG a
KEY IN4
KEY IN2
TO TM-1 CN714
S7113 REC
S7115 POWER
S7125 REW
S7126 FF
S7101 PLAY
S7102 STOP
S7103 PAUSE
TM-2

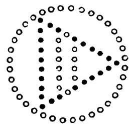
ANODE CONNECTION

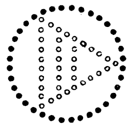
	9G	8G	7G	6G	5G	4G	3G	2G	1G
a	B	●●	a1	a1	a1	a1	a1	a1	ON
b	A	PROG.	b1	b1	b1	b1	b1	b1	●
c	-	SC	c1	c1	c1	c1	c1	c1	DP
d	×2	DATE	d1	d1	d1	d1	d1	d1	M(1)
e	⊖	▣	e1	e1	e1	e1	e1	e1	AFT
f	C	DNR	f1	f1	f1	f1	f1	f1	ST
g	D	VTR	g1	g1	g1	g1	g1	g1	col*1
h	-	QSR	/	\	-	-	-	\	DU
i	●	[M]	a2	a2	a2	a2	a2	a2	OFF
j	E	-	b2	b2	b2	b2	b2	b2	S
k	I	EP	c2	c2	c2	c2	c2	c2	-
l	H	VPS	d2	d2	d2	d2	d2	d2	H
m	J	-	e2	e2	e2	e2	e2	e2	M(2)
n	F	-	f2	f2	f2	f2	f2	f2	-
o	G	LP	g2	g2	g2	g2	g2	g2	col*2

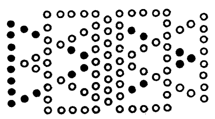
GRID ASSIGNMENT

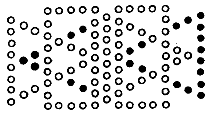

9G
8G
7G
6G
1G
5G
4G
1G
3G
2G
1G
e
X2
d
i
a
b
PROG
VTR
DNR
g
f
h
QSR
SC
c
e
d
M
i
DATE
o
LP
EP
k
VPS
a1
a2
ON
ST
DU
AFT
OFF
H
col1
col2
M2
f1
b1
e1
c1
d1
f2
g2
b2
e2
c2
d2
DP
M
S
j

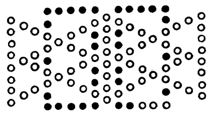
9G: GRAPHIC MODE DISPLAY


Pattern A

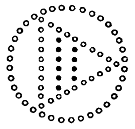

Pattern B

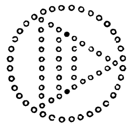

Pattern E

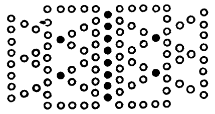

Pattern F

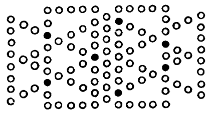

Pattern G

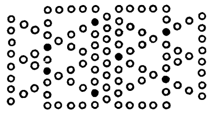
(• : FLD ON)

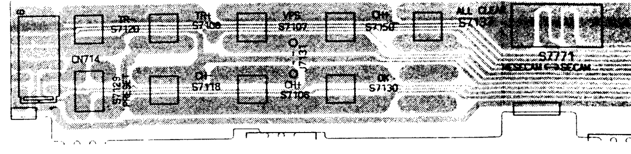

Pattern C


Pattern D

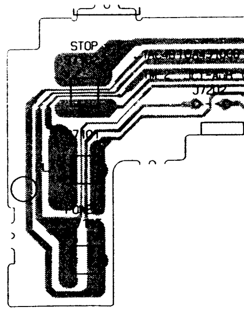

Pattern H


Pattern I

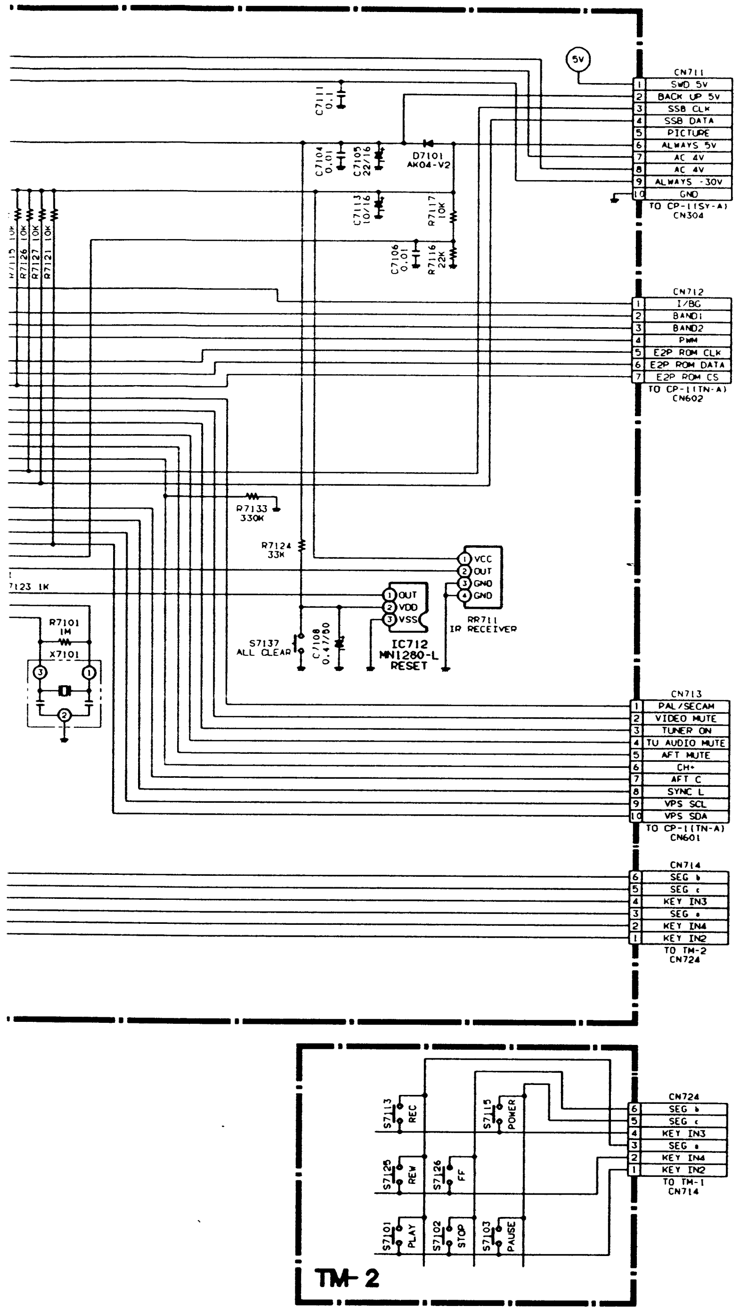

Pattern J


S7120
S7102
S7106
CN714
S7118
S7130
S7771

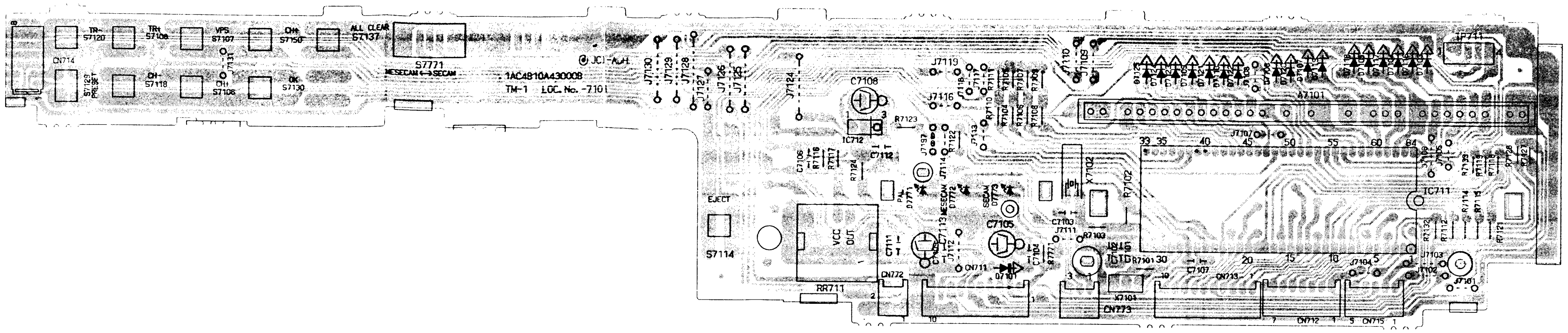
2-19. TM-2



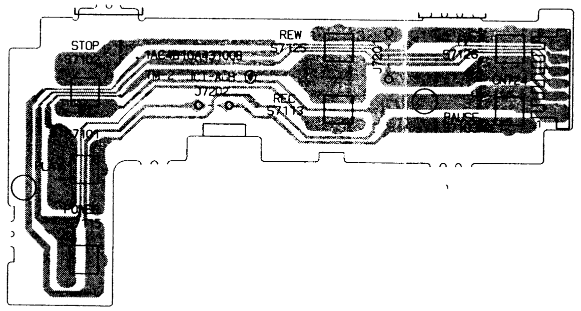
UIT DIAGRAM

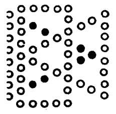

5V
CN711
1 SWD 5V
2 BACK UP 5V
3 SSB CLK
4 SSB DATA
5 PICTURE
6 ALWAYS 5V
7 AC 4V
8 AC 4V
9 ALWAYS -30V
10 GND
TO CP-1(SY-A) CN304
C7111 0.1
C7104 0.01
C7105 22/16
D7101 AK04-V2
C7113 10/16
R7117 10K
C7106 0.01
R7116 22K
R7126 10K
R7127 10K
R7121 10K
CN712
1 I/BG
2 BAND1
3 BAND2
4 PWM
5 E2P ROM CLK
6 E2P ROM DATA
7 E2P ROM CS
TO CP-1(TN-A) CN602
R7133 330K
R7124 33K
7123 1K
R7101 1M
X7101
1 VCC
2 OUT
3 GND
4 GND
RR711 IR RECEIVER
1 OUT
2 VDD
3 VSS
IC712 MN1280-L RESET
S7137 ALL CLEAR
C7108 0.47/50
CN713
1 PAL/SECAM
2 VIDEO MUTE
3 TUNER ON
4 TU AUDIO MUTE
5 AFT MUTE
6 CH+
7 AFT C
8 SYNC L
9 VPS SCL
10 VPS SDA
TO CP-1(TN-A) CN601
CN714
6 SEG b
5 SEG c
4 KEY IN3
3 SEG a
2 KEY IN4
1 KEY IN2
TO TM-2 CN724
S7113 REC
S7115 POWER
S7125 REW
S7126 FF
S7101 PLAY
S7102 STOP
S7103 PAUSE
CN724
6 SEG b
5 SEG c
4 KEY IN3
3 SEG a
2 KEY IN4
1 KEY IN2
TO TM-1 CN714
TM-2

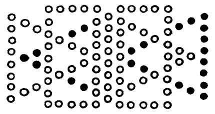
2-18. TM-1 CIRCUIT BOARD

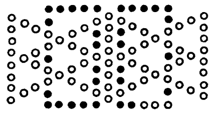

S7120
S7108
S7107
S7150
ALL CLEAR S7137
CH-
VPS
S7118
S7106
S7130
S7771
MESECAM↔SECAM
1AC4810A430008
TM-1 LOC. No. -7101
C7108
IC712
R7123
EJECT
S7114
VCC OUT GND
RR711
C7105
IC711
X7102
CN772
CN773
CN713
CN712
CN715
CN714
A7101

2-19. TM-2 CIRCUIT BOARD

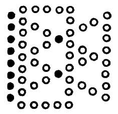

STOP
REW
S7125
REC
S7113
PAUSE
S7102

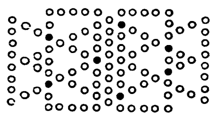

ɔrn E

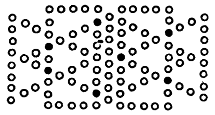

Pattern F


Pattern G

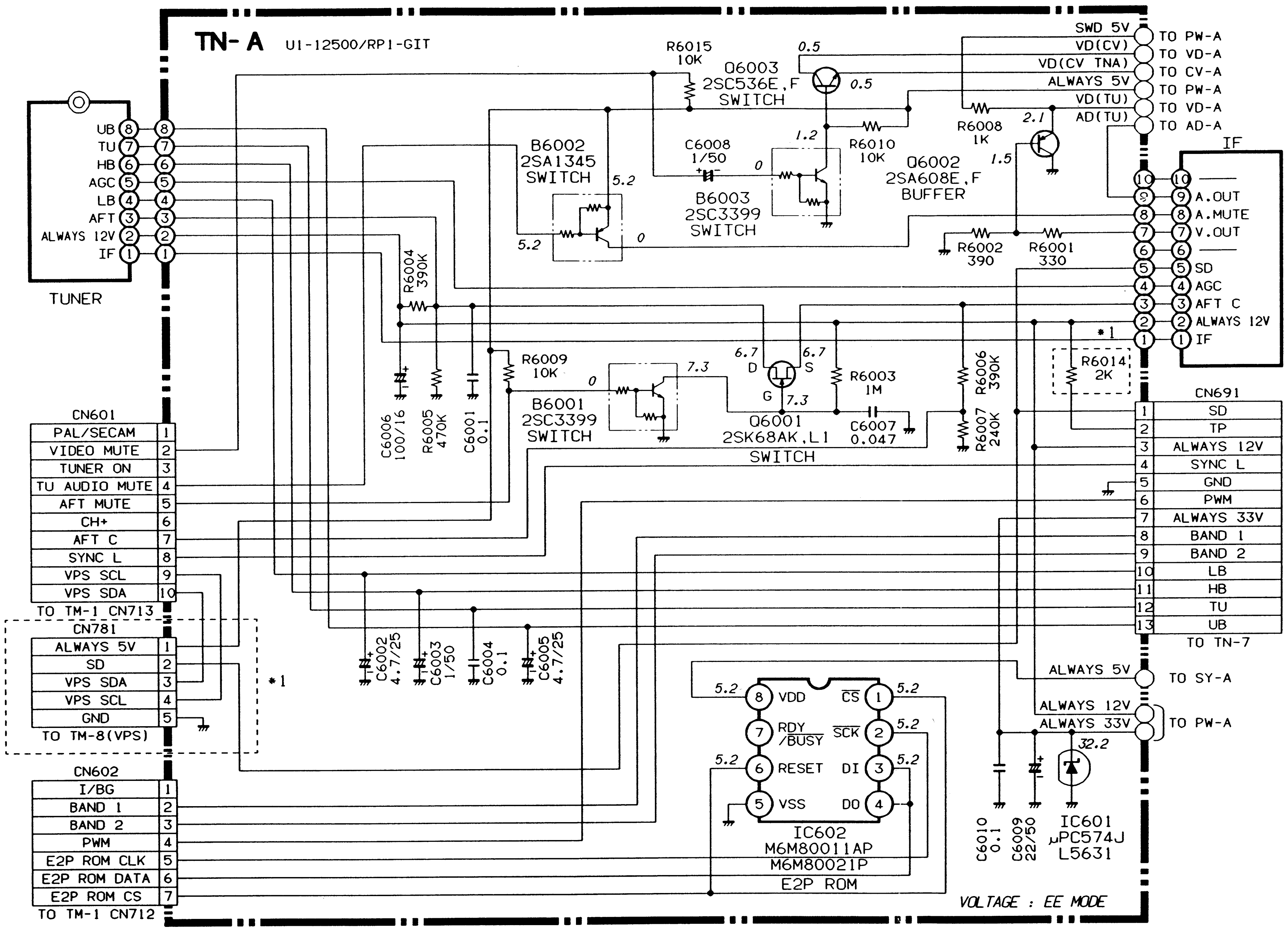
(• : FLD ON)


ɔrn H


Pattern I


Pattern J

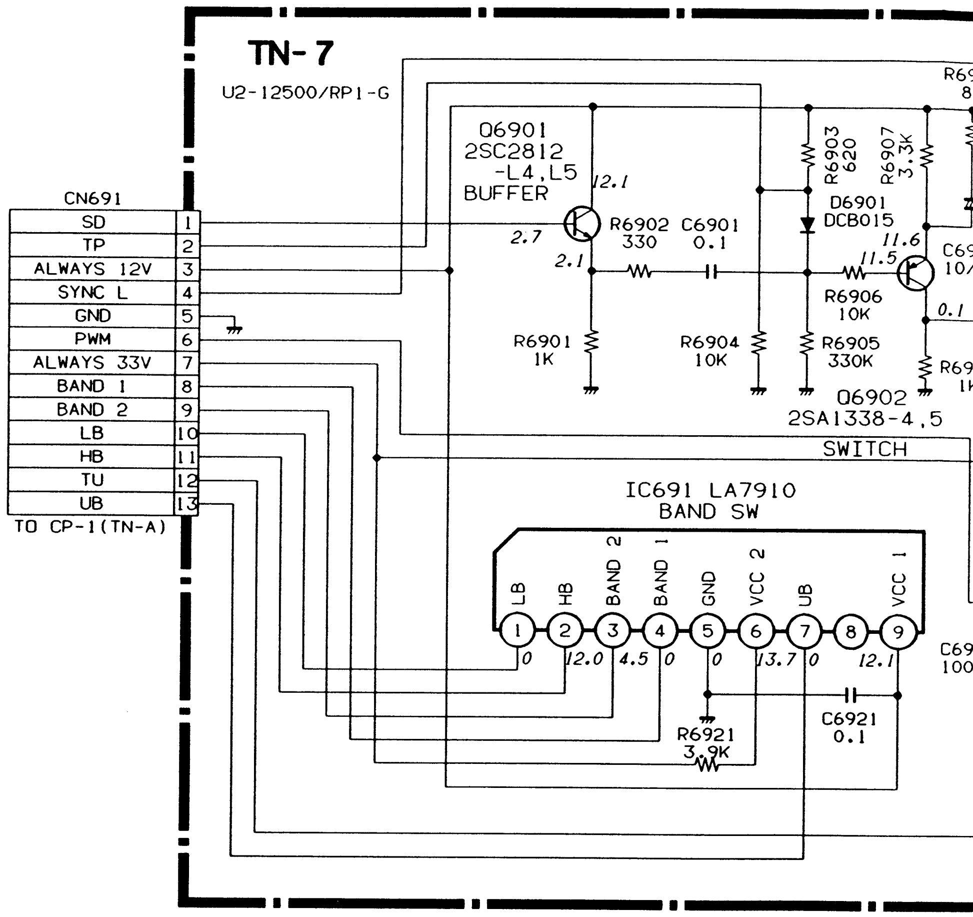
2-20. CP-1 BOARD (TN-A) TUNER IF CONNECTION CIRCUIT DIAGRAM


TN-A
U1-12500/RP1-GIT
TUNER
UB
TU
HB
AGC
LB
AFT
ALWAYS 12V
IF
R6015 10K
Q6003 2SC536E,F SWITCH
0.5
B6002 2SA1345 SWITCH
5.2
C6008 1/50
B6003 2SC3399 SWITCH
1.2
R6010 10K
Q6002 2SA608E,F BUFFER
R6008 1K
2.1
1.5
R6002 390
R6001 330
SWD 5V
VD(CV)
VD(CV TNA)
ALWAYS 5V
VD(TU)
AD(TU)
TO PW-A
TO VD-A
TO CV-A
TO PW-A
TO VD-A
TO AD-A
IF
A.OUT
A.MUTE
V.OUT
SD
AGC
AFT C
ALWAYS 12V
IF
*1
R6014 2K
R6004 390K
R6009 10K
B6001 2SC3399 SWITCH
7.3
6.7
Q6001 2SK68AK,L1 SWITCH
R6003 1M
C6007 0.047
R6006 390K
R6007 240K
C6006 100/16
R6005 470K
C6001 0.1
CN601
PAL/SECAM
VIDEO MUTE
TUNER ON
TU AUDIO MUTE
AFT MUTE
CH+
AFT C
SYNC L
VPS SCL
VPS SDA
TO TM-1 CN713
CN781
ALWAYS 5V
SD
VPS SDA
VPS SCL
GND
TO TM-8(VPS)
*1
CN602
I/BG
BAND 1
BAND 2
PWM
E2P ROM CLK
E2P ROM DATA
E2P ROM CS
TO TM-1 CN712
C6002 4.7/25
C6003 1/50
C6004 0.1
C6005 4.7/25
CN691
SD
TP
ALWAYS 12V
SYNC L
GND
PWM
ALWAYS 33V
BAND 1
BAND 2
LB
HB
TU
UB
TO TN-7
ALWAYS 5V
TO SY-A
ALWAYS 12V
ALWAYS 33V
TO PW-A
32.2
IC602 M6M80011AP M6M80021P E2P ROM
VDD
CS
RDY /BUSY
SCK
RESET
DI
VSS
DO
C6010 0.1
C6009 22/50
IC601 μPC574J L5631
VOLTAGE : EE MODE

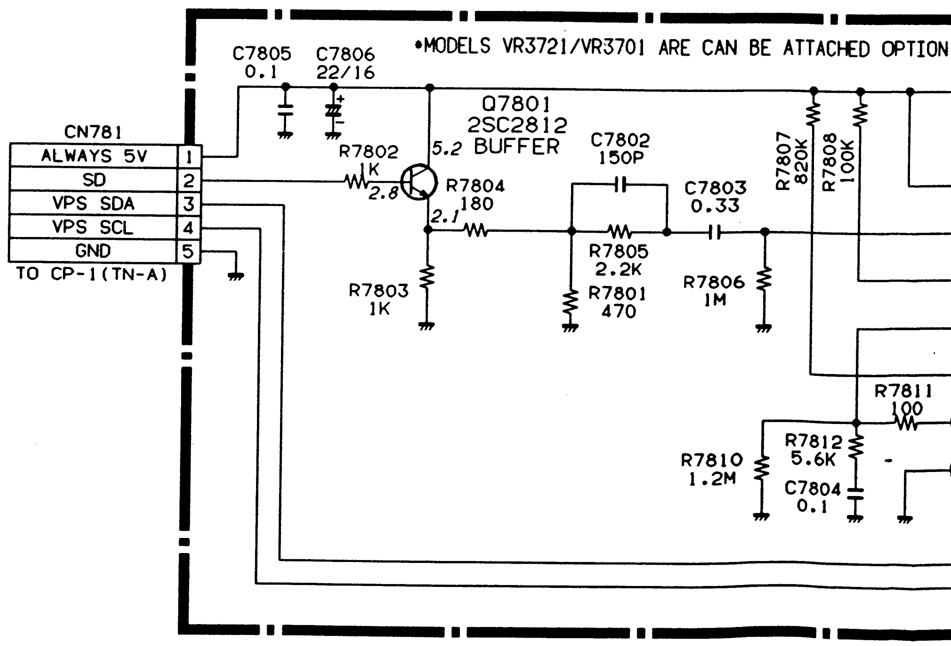
NOTE

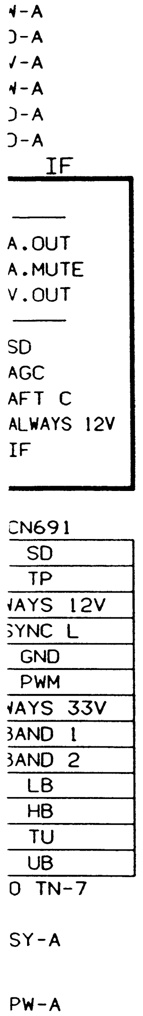
	*1
VR3721 VPS VR3701 VPS	USE
VR3721 VR3701	OPTION
VR3721 LX VR3701 LX	NOT USE

2-21. TN-7 BOARD TUNING DET. & SYNC D


TN-7
U2-12500/RP1-G
CN691
SD
TP
ALWAYS 12V
SYNC L
GND
PWM
ALWAYS 33V
BAND 1
BAND 2
LB
HB
TU
UB
TO CP-1(TN-A)
Q6901 2SC2812 -L4,L5 BUFFER
R6901 1K
R6902 330
C6901 0.1
R6904 10K
R6903 620
R6907 3.3K
D6901 DCB015
R6906 10K
R6905 330K
Q6902 2SA1338-4,5 SWITCH
IC691 LA7910 BAND SW
LB
HB
BAND 2
BAND 1
GND
VCC 2
UB
VCC 1
R6921 3.9K
C6921 0.1

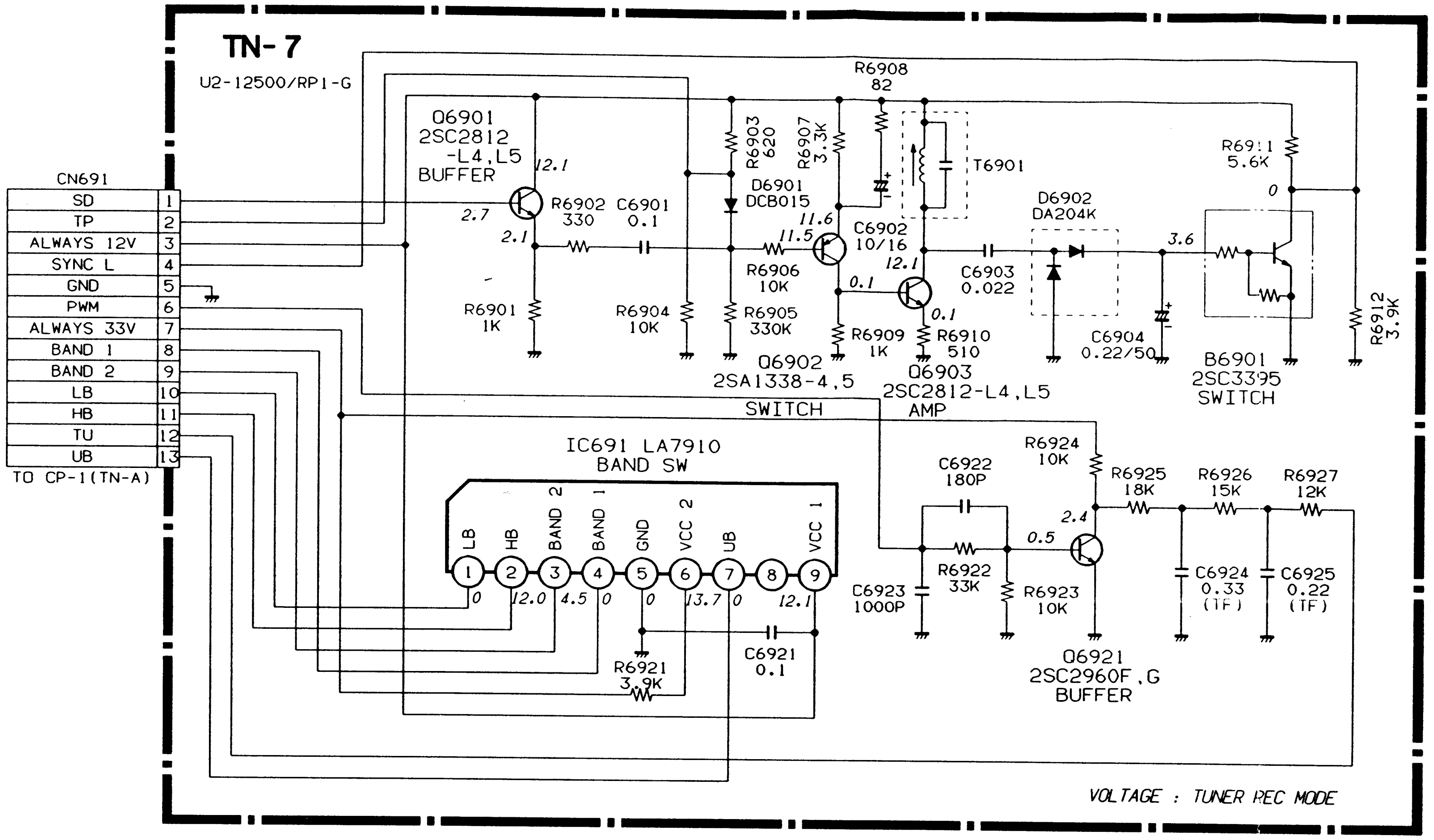
2-23. TM-8 BOARD VPS CIRCUIT DIA


•MODELS VR3721/VR3701 ARE CAN BE ATTACHED OPTION
C7805 0.1
C7806 22/16
CN781
ALWAYS 5V
SD
VPS SDA
VPS SCL
GND
TO CP-1(TN-A)
Q7801 2SC2812 BUFFER
R7802 1K
R7804 180
R7803 1K
C7802 150P
C7803 0.33
R7805 2.2K
R7801 470
R7806 1M
R7807 820K
R7808 100K
R7811 100
R7812 5.6K
R7810 1.2M
C7804 0.1



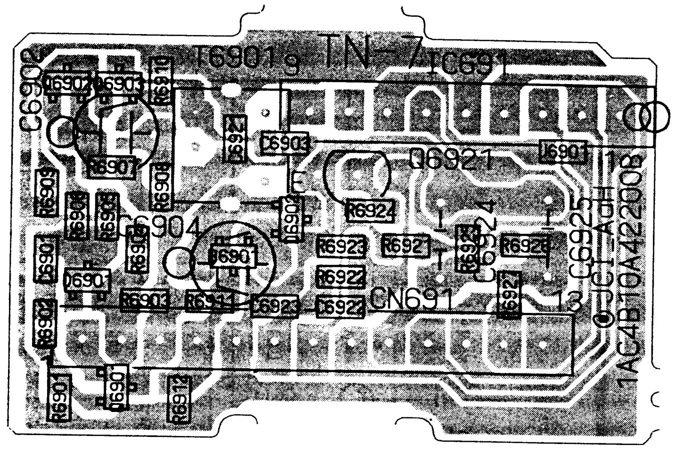
-A
-A
-A
-A
-A
-A
IF
A.OUT
A.MUTE
V.OUT
SD
AGC
AFT C
ALWAYS 12V
IF
CN691
SD
TP
AYS 12V
SYNC L
GND
PWM
AYS 33V
BAND 1
BAND 2
LB
HB
TU
UB
O TN-7
SY-A
PW-A

2-21. TN-7 BOARD TUNING DET. & SYNC DET. CIRCUIT DIAGRAM



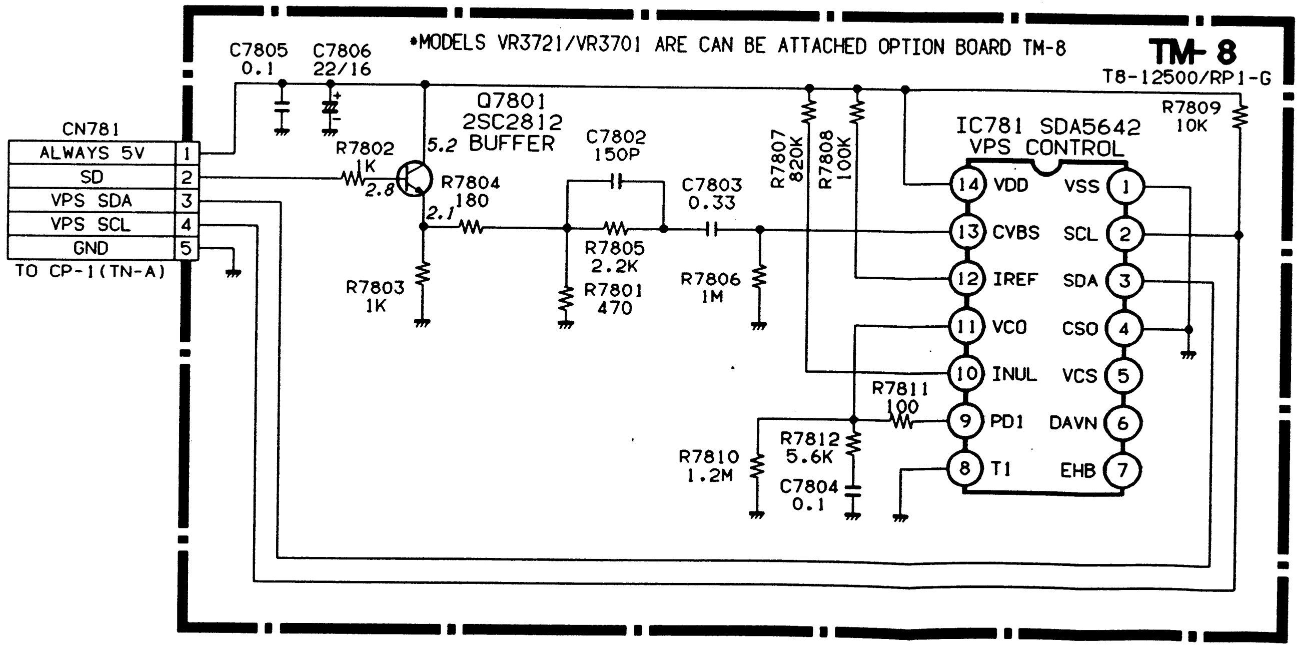
TN-7
U2-12500/RP1-G
CN691
1 SD
2 TP
3 ALWAYS 12V
4 SYNC L
5 GND
6 PWM
7 ALWAYS 33V
8 BAND 1
9 BAND 2
10 LB
11 HB
12 TU
13 UB
TO CP-1(TN-A)
Q6901
2SC2812
-L4,L5
BUFFER
2.7
2.1
12.1
R6902 330
C6901 0.1
R6901 1K
R6904 10K
R6903 620
R6907 3.3K
D6901 DCB015
R6906 10K
R6905 330K
Q6902
2SA1338-4,5
SWITCH
11.6
11.5
C6902 10/16
0.1
12.1
R6908 82
T6901
Q6903
2SC2812-L4,L5
AMP
R6909 1K
R6910 510
0.1
C6903 0.022
D6902 DA204K
C6904 0.22/50
3.6
R6911 5.6K
0
B6901
2SC3395
SWITCH
R6912 3.9K
IC691 LA7910
BAND SW
1 LB
2 HB
3 BAND 2
4 BAND 1
5 GND
6 VCC 2
7 UB
8
9 VCC 1
0
12.0
4.5
0
0
13.7
0
12.1
R6921 3.9K
C6921 0.1
C6922 180P
R6924 10K
R6925 18K
R6926 15K
R6927 12K
2.4
0.5
R6922 33K
C6923 1000P
R6923 10K
C6924 0.33 (IF)
C6925 0.22 (IF)
Q6921
2SC2960F,G
BUFFER
VOLTAGE : TUNER REC MODE

2-22. TN-7 CIRCUIT BOARD



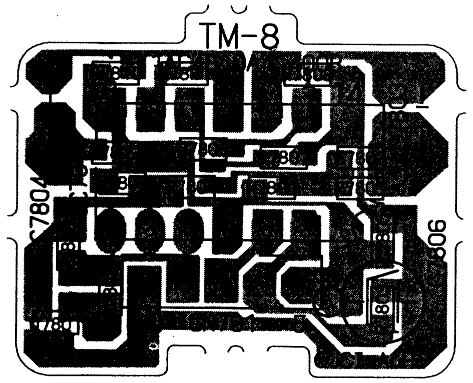
TN-7
T6901
IC691
Q6921
C6904
CN691
R6923
R6921
R6922
C6922
C6923
R6924
R6926
R6927
R6925
1AC4B10A42008

2-23. TM-8 BOARD VPS CIRCUIT DIAGRAM

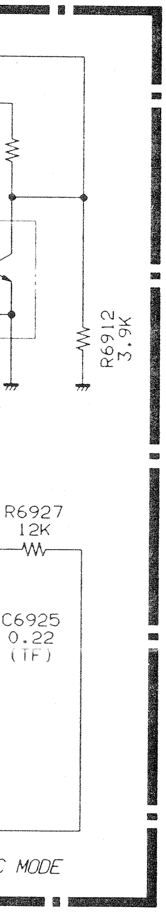


•MODELS VR3721/VR3701 ARE CAN BE ATTACHED OPTION BOARD TM-8
TM-8
T8-12500/RP1-G
CN781
1 ALWAYS 5V
2 SD
3 VPS SDA
4 VPS SCL
5 GND
TO CP-1(TN-A)
C7805 0.1
C7806 22/16
Q7801
2SC2812
BUFFER
5.2
R7802 1K
2.8
2.1
R7804 180
R7803 1K
C7802 150P
C7803 0.33
R7805 2.2K
R7801 470
R7806 1M
R7807 820K
R7808 100K
R7809 10K
IC781 SDA5642
VPS CONTROL
14 VDD
13 CVBS
12 IREF
11 VCO
10 INUL
9 PD1
8 T1
1 VSS
2 SCL
3 SDA
4 CSO
5 VCS
6 DAVN
7 EHB
R7811 100
R7812 5.6K
R7810 1.2M
C7804 0.1

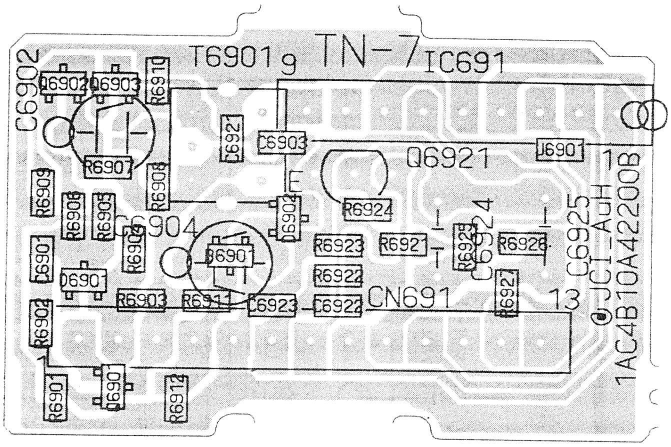
2-24. TM-8 CIRCUIT BOARD



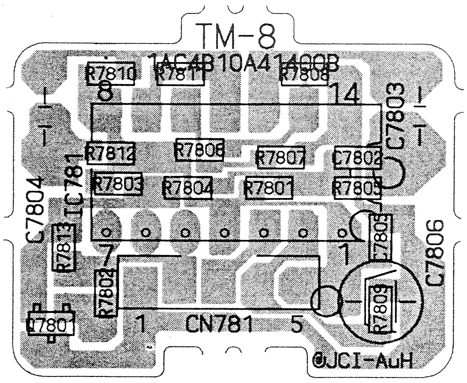
TM-8
C7804
806


R6912
3.9K
R6927
12K
C6925
0.22
(TF)
C MODE

2-22. TN-7 CIRCUIT BOARD


TN-7
T6901
9
IC691
C6902
Q6902
Q6903
R6910
C6921
C6903
Q6921
J6901
1
R6907
R6906
R6909
R6908
R6905
C6904
R6904
C6901
R6924
D6901
D6902
R6923
R6921
R6925
C6924
R6926
C6925
@JCI-AuH
1AC4B10A42200B
D6901
R6903
R6911
C6923
R6922
C6922
CN691
R6927
13
R6902
R6901
D6903
R6912

2-24. TM-8 CIRCUIT BOARD


TM-8
1AC4B10A41400B
R7810
R7811
R7808
8
14
C7803
R7812
R7806
R7807
C7802
C7804
IC781
R7803
R7804
R7801
R7805
C7805
C7806
R7813
7
1
R7802
R7809
Q7801
1
CN781
5
@JCI-AuH

K

J

I

H

G

F

E

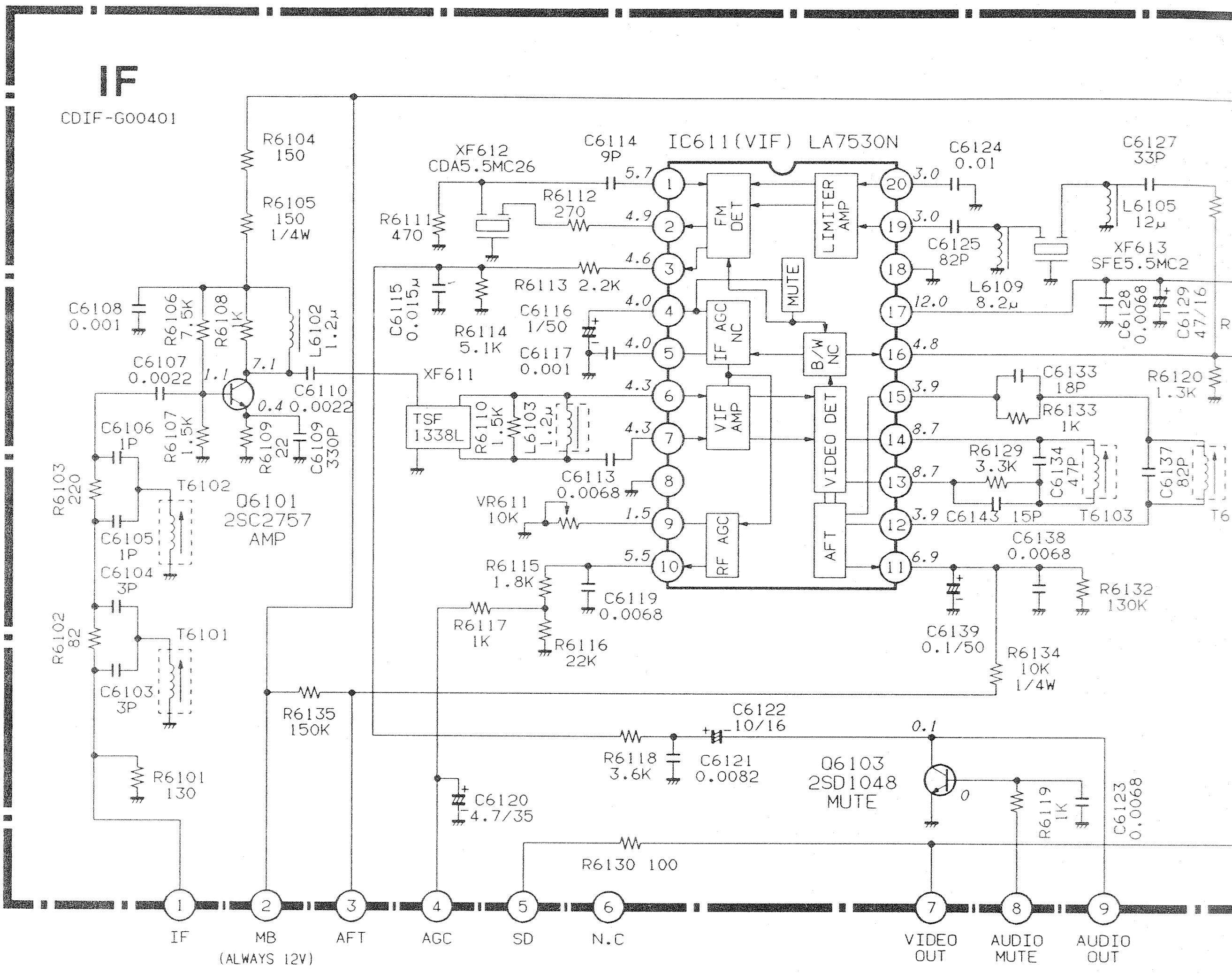
D

C

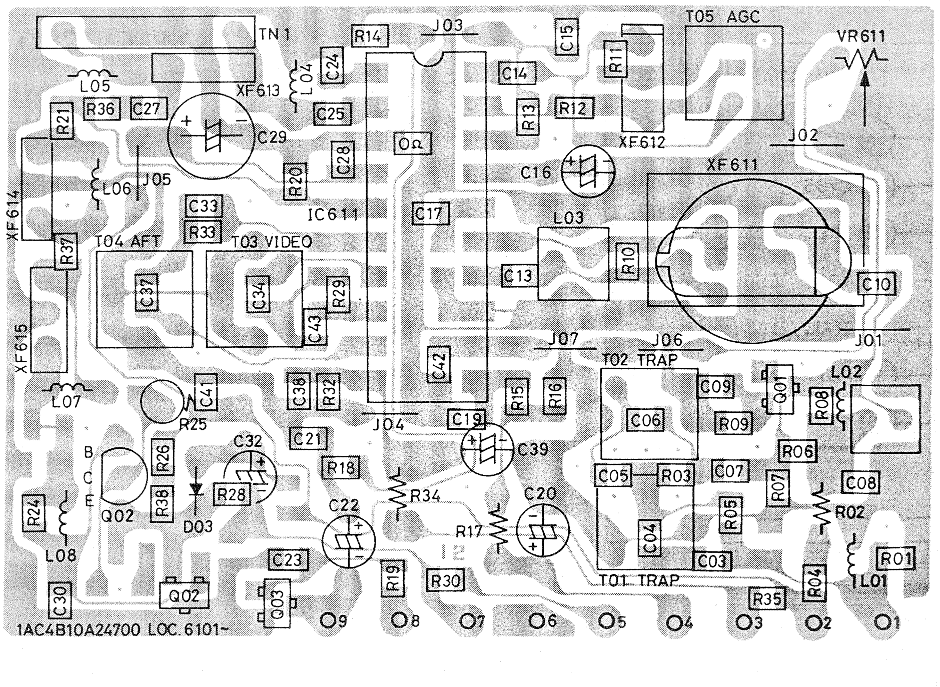
B

A

2-25. IF CIRCUIT DIAGRAM

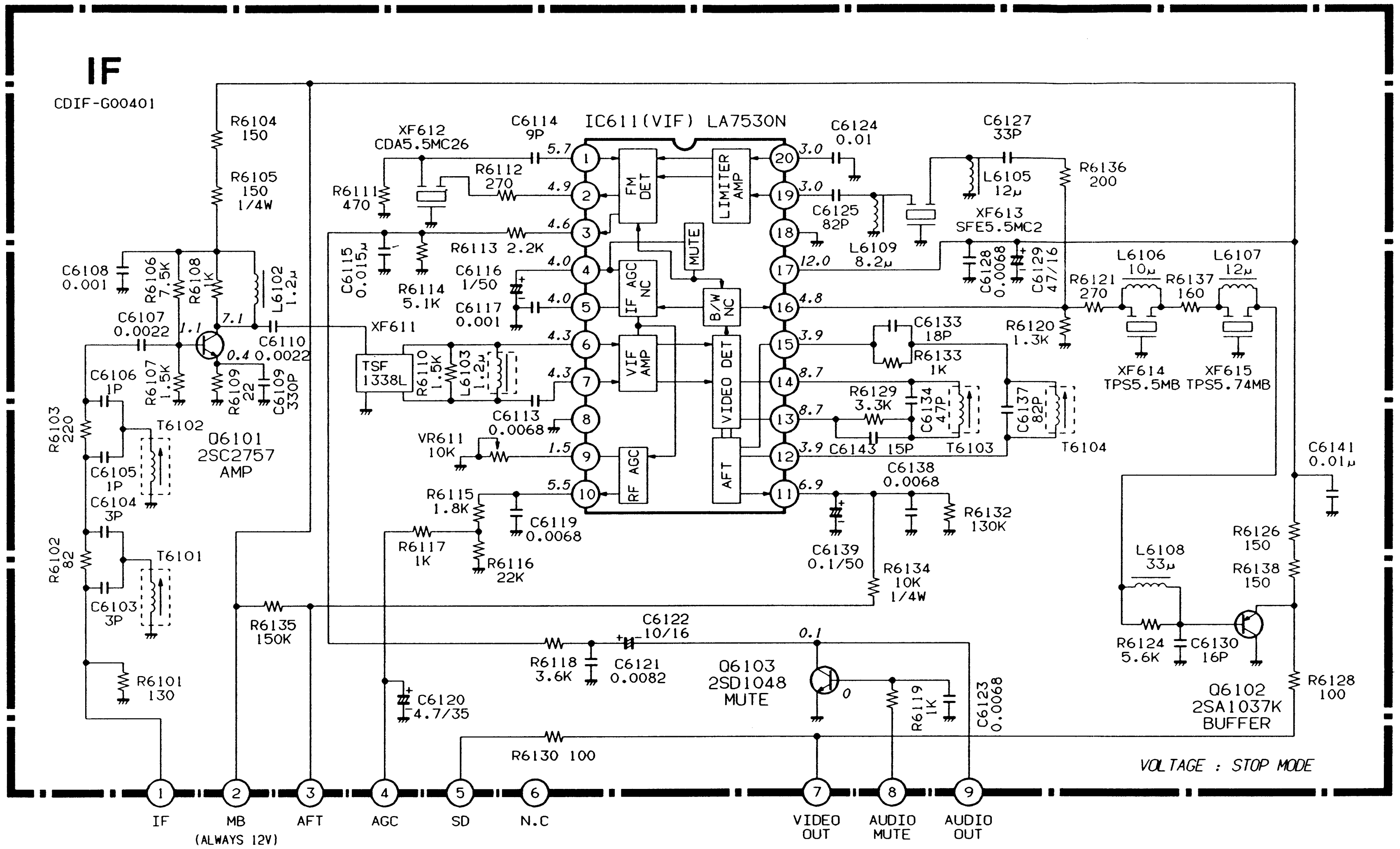

IF
CDIF-G00401
R6104 150
R6105 150 1/4W
C6108 0.001
R6106 7.5K
R6108 1K
L6102 1.2μ
C6107 0.0022
C6110 0.0022
C6106 1P
R6107 1.5K
R6109 22
C6109 330P
R6103 220
T6102
Q6101 2SC2757 AMP
C6105 1P
C6104 3P
R6102 82
T6101
C6103 3P
R6101 130
R6135 150K
XF612 CDA5.5MC26
R6111 470
R6112 270
C6114 9P
IC611(VIF) LA7530N
FM DET
LIMITER AMP
MUTE
IF AGC NC
B/W NC
VIF AMP
VIDEO DET
RF AGC
AFT
C6115 0.015μ
R6113 2.2K
R6114 5.1K
C6116 1/50
C6117 0.001
XF611
TSF 1338L
R6110 1.5K
L6103 1.2μ
C6113 0.0068
VR611 10K
R6115 1.8K
C6119 0.0068
R6117 1K
R6116 22K
C6120 4.7/35
C6124 0.01
C6125 82P
L6109 8.2μ
C6127 33P
L6105 12μ
XF613 SFE5.5MC2
C6128 0.0068
C6129 47/16
C6133 18P
R6133 1K
R6120 1.3K
R6129 3.3K
C6134 47P
C6143 15P
T6103
C6137 82P
C6138 0.0068
R6132 130K
C6139 0.1/50
R6134 10K 1/4W
C6122 10/16
R6118 3.6K
C6121 0.0082
Q6103 2SD1048 MUTE
R6119 1K
C6123 0.0068
R6130 100
5.7
4.9
4.6
4.0
4.0
4.3
4.3
1.5
5.5
3.0
3.0
12.0
4.8
3.9
8.7
8.7
3.9
6.9
1.1
7.1
0.4
0.1
0
IF
MB (ALWAYS 12V)
AFT
AGC
SD
N.C
VIDEO OUT
AUDIO MUTE
AUDIO OUT

2-26. IF CIRCUIT BOARD

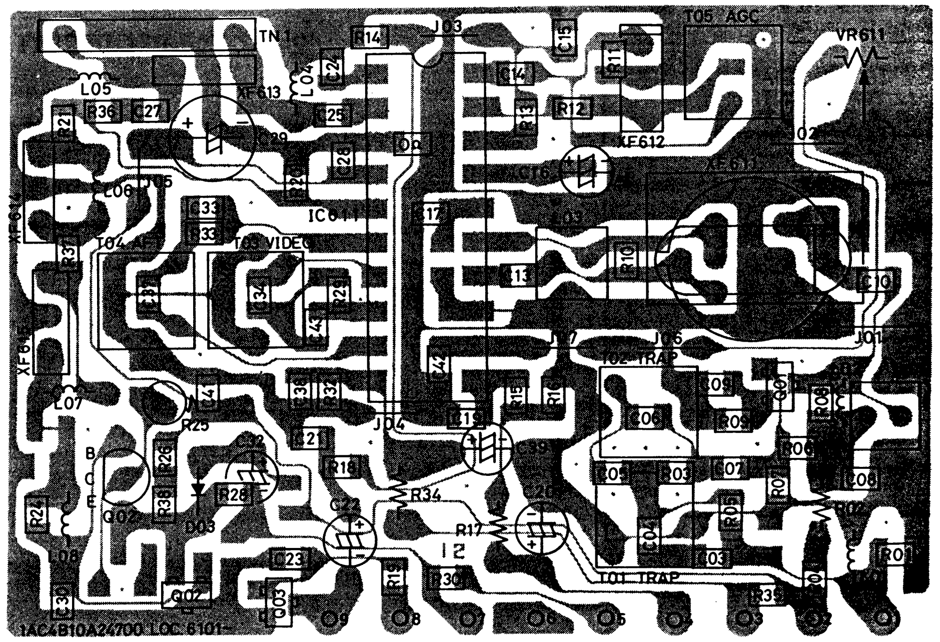

TN1
L05
XF613
L04
C24
R14
J03
C15
R11
T05 AGC
VR611
R36
C27
C29
C25
C14
R13
R12
XF612
J02
R21
C28
R20
OΩ
C16
XF611
L06
J05
XF614
C33
R33
IC611
C17
L03
R37
T04 AFT
T03 VIDEO
C37
C34
R29
C13
R10
C10
XF615
C43
C42
J07
J06
J01
T02 TRAP
Q01
L02
L07
C41
C38
R32
R15
R16
C09
C06
R09
R08
R25
J04
C19
C39
C32
C21
R06
B
C
E
R26
R18
C05
R03
C07
R07
C08
Q02
R38
R28
D03
C22
R34
R17
C20
R05
R02
R24
L08
C23
R19
R30
C04
C03
R04
R01
L01
T01 TRAP
C30
Q02
Q03
R35
9
8
7
6
5
4
3
2
1
1AC4B10A24700 LOC.6101~

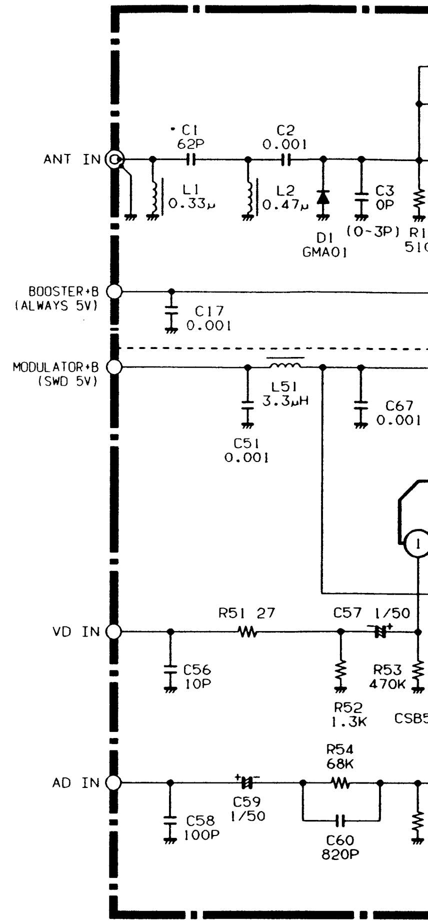
1 2 3 4 5 6 7 8

2-25. IF CIRCUIT DIAGRAM

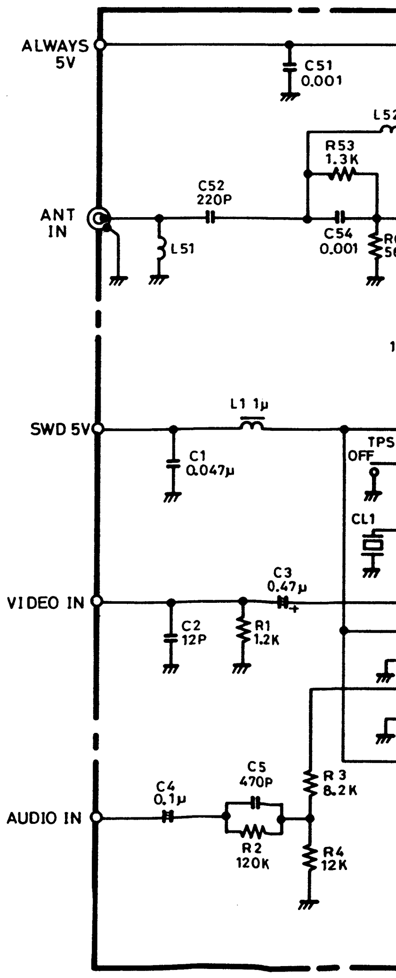

IF
CDIF-G00401
IC611(VIF) LA7530N
FM DET
LIMITER AMP
MUTE
IF AGC NC
B/W NC
VIF AMP
VIDEO DET
RF AGC
AFT
XF612 CDA5.5MC26
XF613 SFE5.5MC2
XF614 TPS5.5MB
XF615 TPS5.74MB
XF611 TSF 1338L
Q6101 2SC2757 AMP
Q6102 2SA1037K BUFFER
Q6103 2SD1048 MUTE
T6101
T6102
T6103
T6104
R6104 150
R6105 150 1/4W
R6135 150K
R6101 130
R6102 82
R6103 220
R6106 7.5K
R6107 1.5K
R6108 1K
R6109 22
R6110 1.5K
R6111 470
R6112 270
R6113 2.2K
R6114 5.1K
R6115 1.8K
R6116 22K
R6117 1K
R6118 3.6K
R6119 1K
R6120 1.3K
R6121 270
R6124 5.6K
R6126 150
R6128 100
R6129 3.3K
R6130 100
R6132 130K
R6133 1K
R6134 10K 1/4W
R6136 200
R6137 160
R6138 150
VR611 10K
C6103 3P
C6104 3P
C6105 1P
C6106 1P
C6107 0.0022
C6108 0.001
C6109 330P
C6110 0.0022
C6113 0.0068
C6114 9P
C6115 0.015μ
C6116 1/50
C6117 0.001
C6119 0.0068
C6120 4.7/35
C6121 0.0082
C6122 10/16
C6123 0.0068
C6124 0.01
C6125 82P
C6127 33P
C6128 0.0068
C6129 47/16
C6130 16P
C6133 18P
C6134 47P
C6137 82P
C6138 0.0068
C6139 0.1/50
C6141 0.01μ
C6143 15P
L6102 1.2μ
L6103 1.2μ
L6105 12μ
L6106 10μ
L6107 12μ
L6108 33μ
L6109 8.2μ
5.7
4.9
4.6
4.0
4.0
4.3
4.3
1.5
5.5
3.0
3.0
12.0
4.8
3.9
8.7
8.7
3.9
6.9
1.1
7.1
0.4
0.1
0
1 IF
2 MB (ALWAYS 12V)
3 AFT
4 AGC
5 SD
6 N.C
7 VIDEO OUT
8 AUDIO MUTE
9 AUDIO OUT
VOLTAGE : STOP MODE

2-26. IF CIRCUIT BOARD

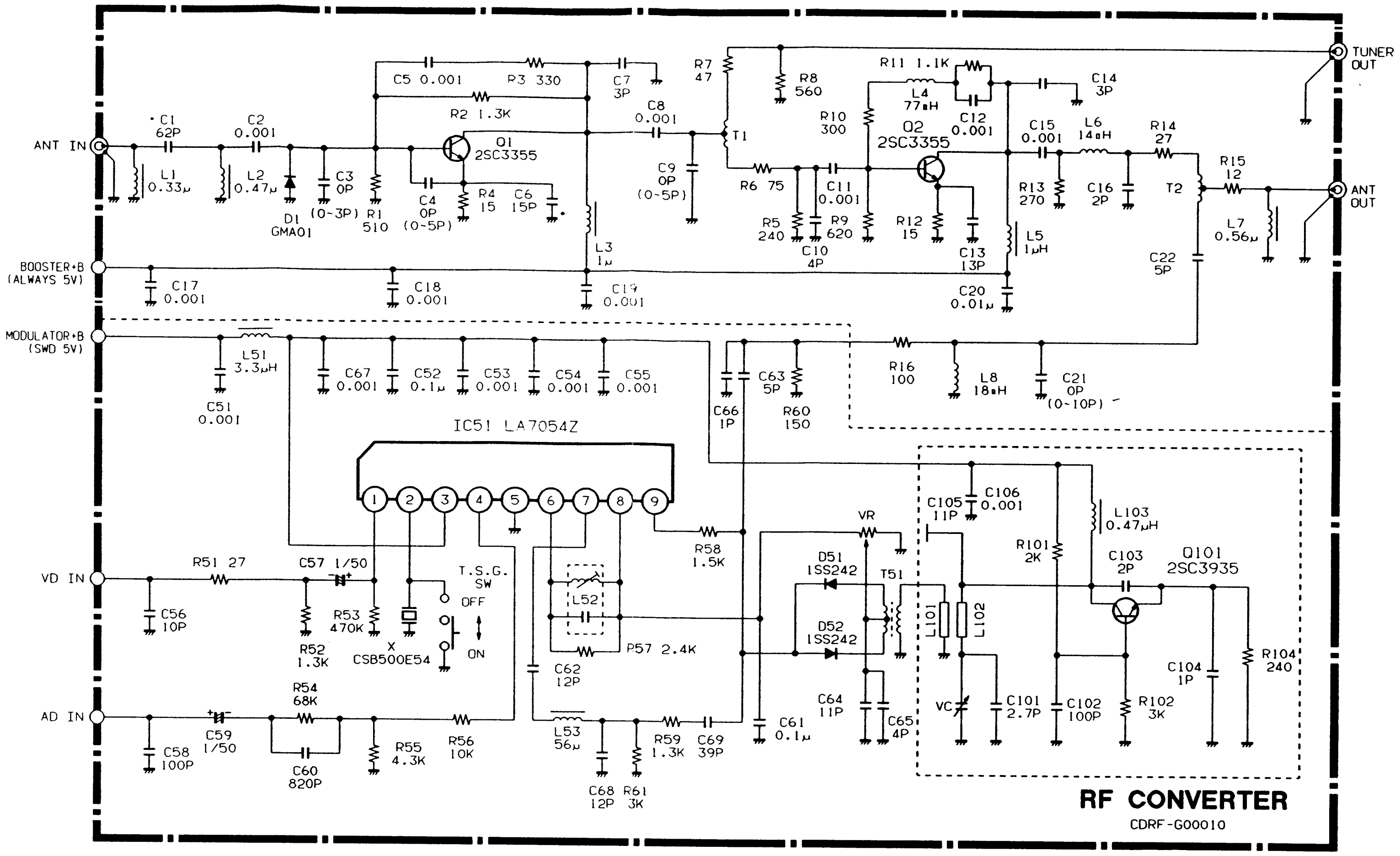

T05 AGC
VR611
L05
L06
L07
T04
T03 VIDEO
IC611
XF611
XF612
XF613
XF614
T02 TRAP
T01 TRAP
Q01
Q02
Q03
D03
1AC4B10A24700 LOC 6101


ANT IN
C1 62P
C2 0.001
L1 0.33μ
L2 0.47μ
C3 0P (0-3P)
D1 GMA01
BOOSTER+B (ALWAYS 5V)
C17 0.001
MODULATOR+B (SWD 5V)
L51 3.3μH
C51 0.001
C67 0.001
VD IN
R51 27
C56 10P
C57 1/50
R52 1.3K
R53 470K
AD IN
C58 100P
C59 1/50
R54 68K
C60 820P

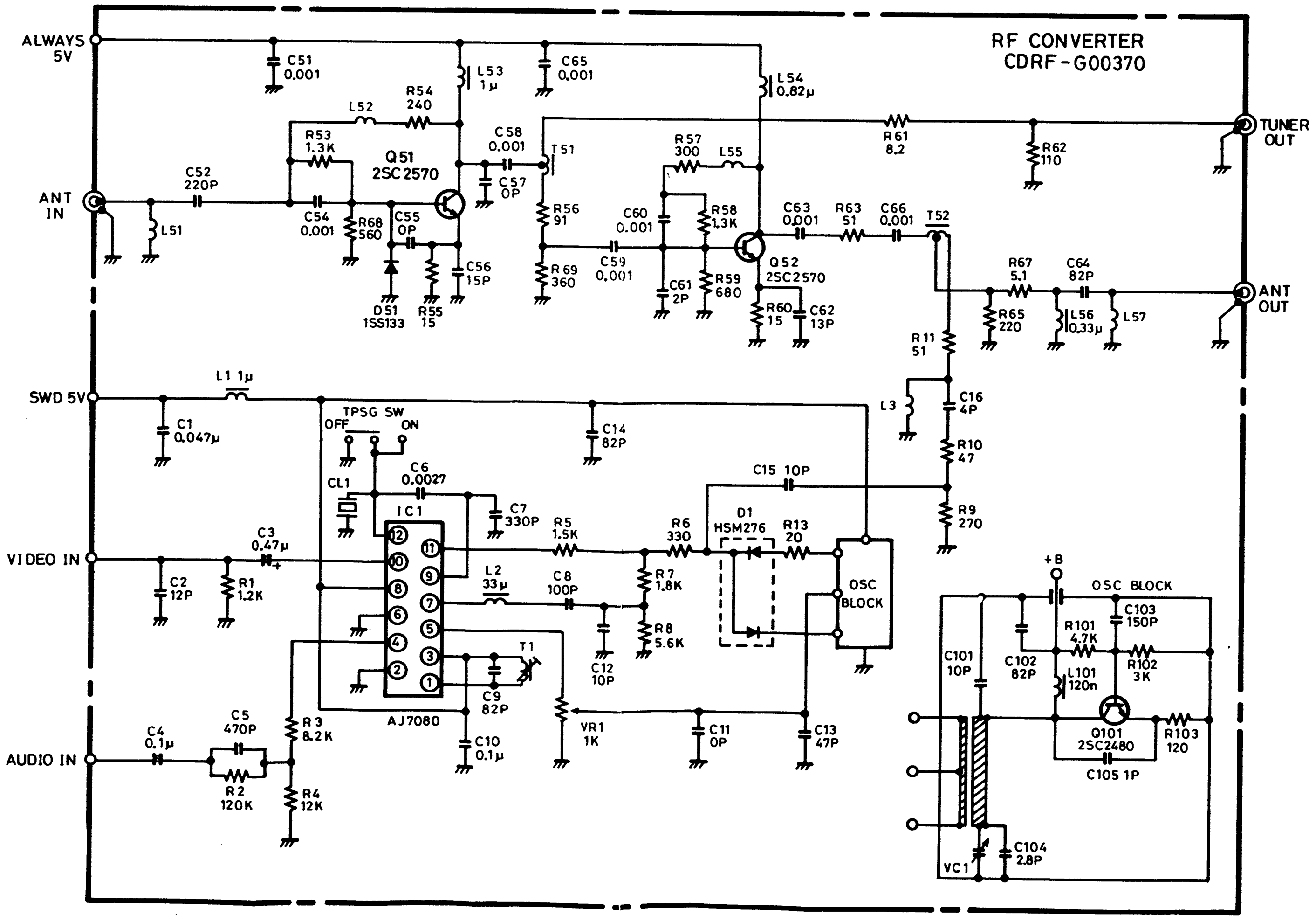
Note: Either one of these RF converters, type CDRF-G00010 or CDRF-G00370 is used, depending on availability.


ALWAYS 5V
C51 0.001
R53 1.3K
C52 220P
ANT IN
L51
C54 0.001
SWD 5V
L1 1μ
C1 0.047μ
CL1
VIDEO IN
C2 12P
C3 0.47μ
R1 1.2K
AUDIO IN
C4 0.1μ
C5 470P
R2 120K
R3 8.2K
R4 12K

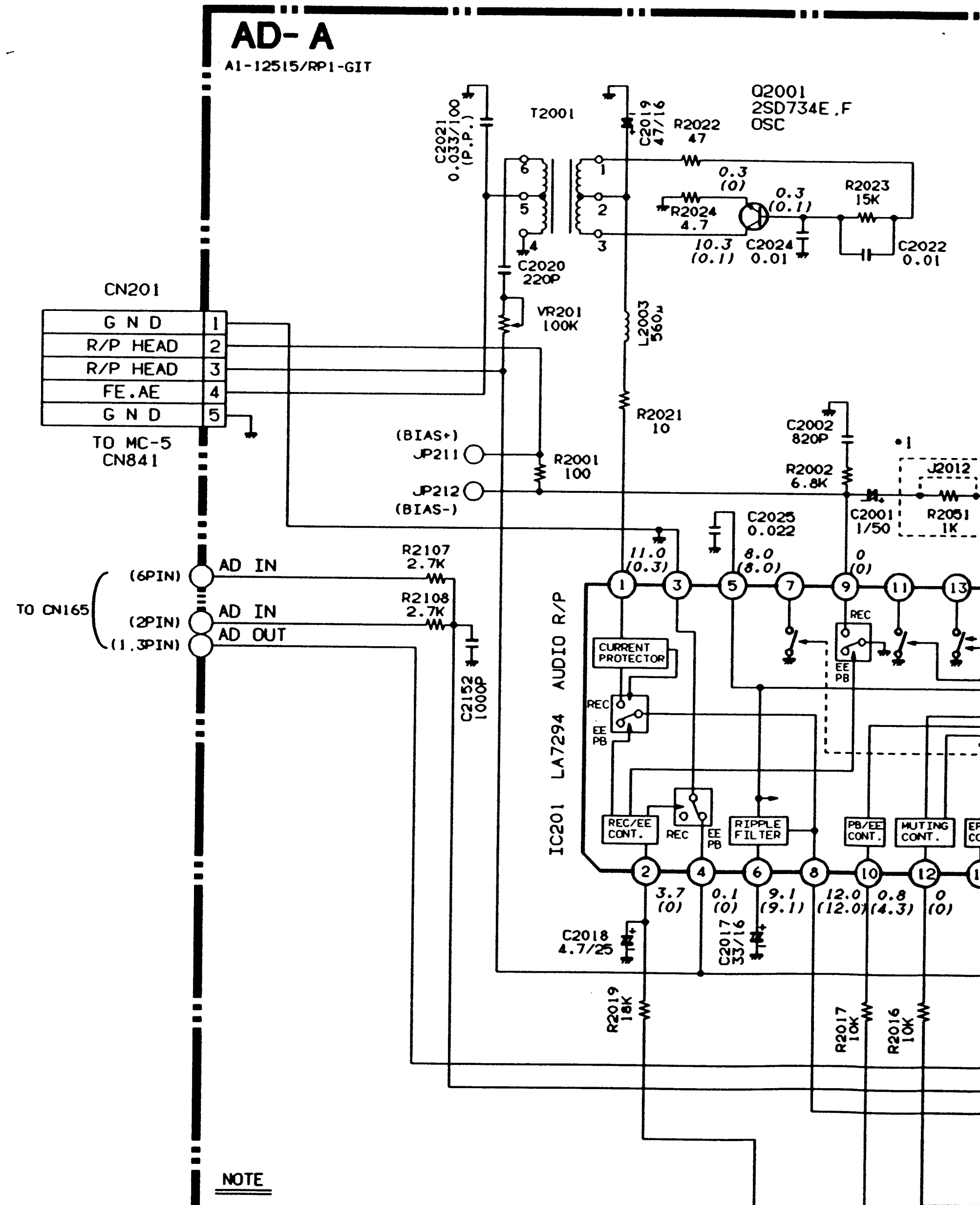
2-27. RF CONVERTER CIRCUIT


ANT IN
BOOSTER+B (ALWAYS 5V)
MODULATOR+B (SWD 5V)
VD IN
AD IN
TUNER OUT
ANT OUT
C1 62P
C2 0.001
L1 0.33μ
L2 0.47μ
D1 GMA01
C3 0P (0-3P)
R1 510
C4 0P (0-5P)
C5 0.001
R3 330
R2 1.3K
Q1 2SC3355
R4 15
C6 15P
C7 3P
C8 0.001
C9 0P (0-5P)
L3 1μ
R7 47
R8 560
T1
R11 1.1K
L4 77nH
C12 0.001
Q2 2SC3355
R10 300
R6 75
C11 0.001
R5 240
R9 620
C10 4P
R12 15
C13 13P
L5 1μH
C14 3P
C15 0.001
L6 14nH
R14 27
R13 270
C16 2P
T2
R15 12
L7 0.56μ
C22 5P
C17 0.001
C18 0.001
C19 0.001
C20 0.01μ
L51 3.3μH
C51 0.001
C67 0.001
C52 0.1μ
C53 0.001
C54 0.001
C55 0.001
C66 1P
C63 5P
R60 150
R16 100
L8 18nH
C21 0P (0-10P)
IC51 LA7054Z
R51 27
C56 10P
C57 1/50
R53 470K
R52 1.3K
X CSB500E54
T.S.G. SW OFF ON
L52
P57 2.4K
C62 12P
R58 1.5K
R54 68K
C59 1/50
C58 100P
C60 820P
R55 4.3K
R56 10K
L53 56μ
R59 1.3K
C69 39P
C68 12P
R61 3K
C61 0.1μ
VR
D51 1SS242
D52 1SS242
T51
C64 11P
C65 4P
C105 11P
C106 0.001
L101
L102
R101 2K
L103 0.47μH
C103 2P
Q101 2SC3935
C104 1P
R104 240
VC
C101 2.7P
C102 100P
R102 3K
RF CONVERTER
CDRF-G00010

Note: Either one of these RF converters, type CDRF-G00010 or CDRF-G00370 is used, depending on availability.


RF CONVERTER
CDRF-G00370
ALWAYS 5V
ANT IN
SWD 5V
VIDEO IN
AUDIO IN
TUNER OUT
ANT OUT
C51 0.001
L53 1μ
C65 0.001
L54 0.82μ
L52
R54 240
R53 1.3K
Q51 2SC2570
C52 220P
L51
C54 0.001
R68 560
C55 0P
D51 1SS133
R55 15
C56 15P
C58 0.001
C57 0P
T51
R56 91
R69 360
R57 300
L55
C60 0.001
R58 1.3K
C59 0.001
C61 2P
R59 680
Q52 2SC2570
R60 15
C62 13P
C63 0.001
R63 51
C66 0.001
T52
R61 8.2
R62 110
R67 5.1
C64 82P
R65 220
L56 0.33μ
L57
R11 51
L3
C16 4P
R10 47
R9 270
L1 1μ
C1 0.047μ
TPSG SW OFF ON
C14 82P
C6 0.0027
CL1
C7 330P
IC1
AJ7080
R5 1.5K
R6 330
D1 HSM276
R13 20
C15 10P
OSC BLOCK
C3 0.47μ
C2 12P
R1 1.2K
L2 33μ
C8 100P
R7 1.8K
R8 5.6K
C12 10P
T1
C9 82P
C10 0.1μ
VR1 1K
C11 0P
C13 47P
C4 0.1μ
C5 470P
R2 120K
R3 8.2K
R4 12K
+B
C103 150P
R101 4.7K
R102 3K
C101 10P
C102 82P
L101 120n
Q101 2SC2480
R103 120
C105 1P
VC1
C104 2.8P

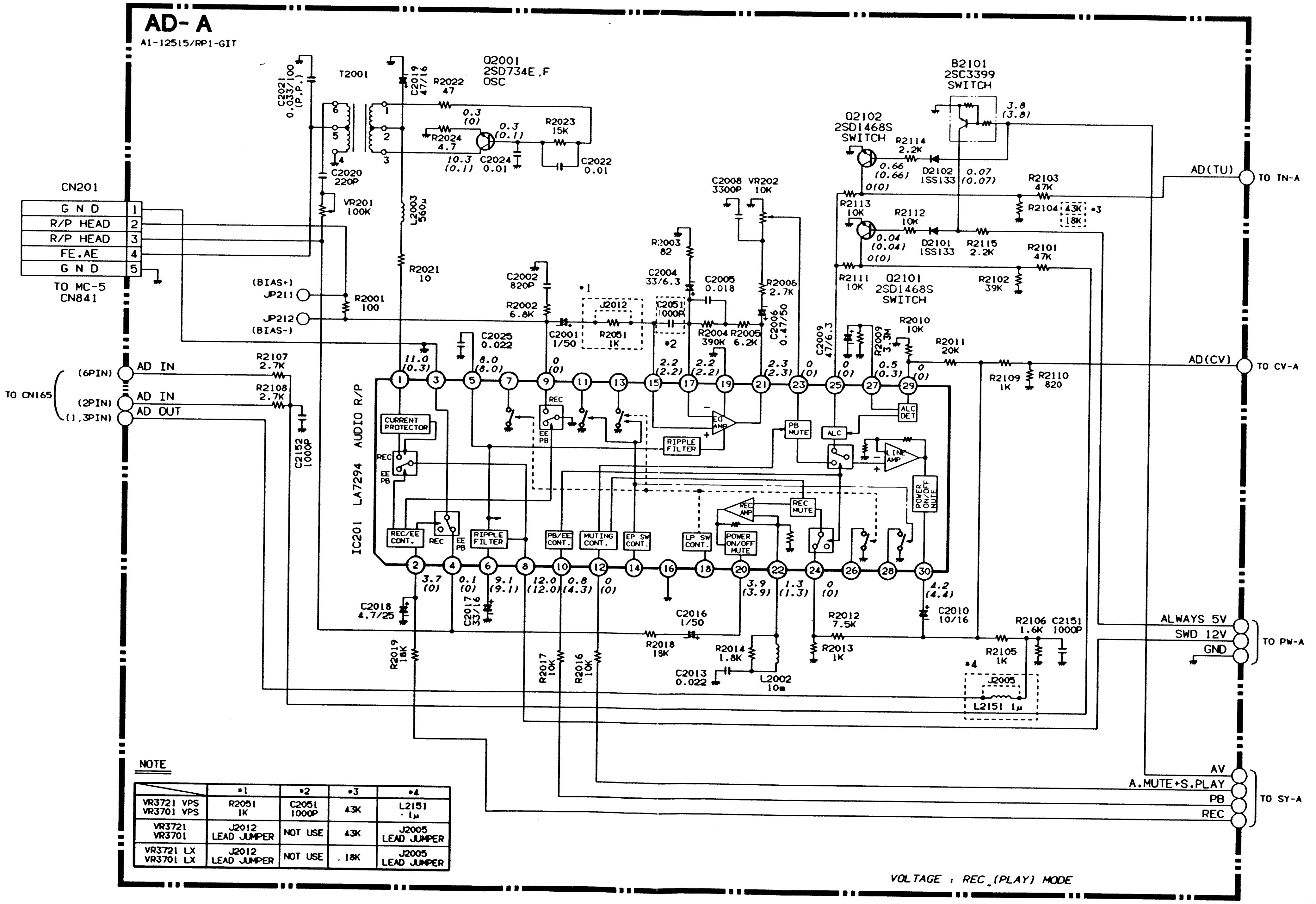
2-28. CP-1 BOARD (AD-A


AD- A
A1-12515/RP1-GIT
CN201
G N D 1
R/P HEAD 2
R/P HEAD 3
FE.AE 4
G N D 5
TO MC-5
CN841
TO CN165
(6PIN)
(2PIN)
(1,3PIN)
AD IN
AD IN
AD OUT
R2107
2.7K
R2108
2.7K
C2152
1000P
(BIAS+)
JP211
JP212
(BIAS-)
R2001
100
C2021
0.033/100
(P.P.)
T2001
C2020
220P
VR201
100K
C2019
47/16
R2022
47
Q2001
2SD734E.F
OSC
0.3
(0)
R2024
4.7
0.3
(0.1)
10.3
(0.1)
C2024
0.01
R2023
15K
C2022
0.01
L2003
560μ
R2021
10
C2002
820P
R2002
6.8K
C2001
1/50
*1
J2012
R2051
1K
C2025
0.022
11.0
(0.3)
8.0
(8.0)
0
(0)
IC201 LA7294 AUDIO R/P
CURRENT PROTECTOR
REC
EE
PB
REC/EE CONT.
RIPPLE FILTER
PB/EE CONT.
MUTING CONT.
3.7
(0)
0.1
(0)
9.1
(9.1)
12.0
(12.0)
0.8
(4.3)
0
(0)
C2018
4.7/25
C2017
33/16
R2019
18K
R2017
10K
R2016
10K

NOTE

	*1	*2	*3	*4
VR3721 VPS VR3701 VPS	R2051 1K	C2051 1000P	43K	L2151 1μ
VR3721 VR3701	J2012 LEAD JUMPER	NOT USE	43K	J2005 LEAD JUMPER
VR3721 LX VR3701 LX	J2012 LEAD JUMPER	NOT USE	18K	J2005 LEAD JUMPER

2-28. CP-1 BOARD (AD-A) AUDIO CIRCUIT DIAGRAM


AD- A
A1-12515/RP1-GIT
CN201
G N D
R/P HEAD
R/P HEAD
FE.AE
G N D
TO MC-5
CN841
(BIAS+)
JP211
JP212
(BIAS-)
R2001
100
TO CN165
(6PIN)
(2PIN)
(1,3PIN)
AD IN
AD IN
AD OUT
R2107
2.7K
R2108
2.7K
C2152
1000P
C2021
0.033/100
(P.P.)
T2001
C2020
220P
VR201
100K
C2019
47/16
R2022
47
Q2001
2SD734E,F
OSC
R2024
4.7
C2024
0.01
R2023
15K
C2022
0.01
L2003
560μ
R2021
10
C2002
820P
R2002
6.8K
C2025
0.022
C2001
1/50
J2012
R2051
1K
R2003
82
C2004
33/6.3
C2005
0.018
C2051
1000P
R2004
390K
R2005
6.2K
C2008
3300P
VR202
10K
R2006
2.7K
C2006
0.47/50
C2009
47/6.3
R2009
3.3M
R2010
10K
R2011
20K
R2109
1K
R2110
820
IC201 LA7294 AUDIO R/P
CURRENT PROTECTOR
REC
EE
PB
EQ AMP
RIPPLE FILTER
PB MUTE
ALC
ALC DET
LINE AMP
POWER ON/OFF MUTE
REC AMP
REC MUTE
REC/EE CONT.
RIPPLE FILTER
PB/EE CONT.
MUTING CONT.
EP SW CONT.
LP SW CONT.
POWER ON/OFF MUTE
C2018
4.7/25
C2017
33/16
R2019
18K
R2017
10K
R2016
10K
C2016
1/50
R2018
18K
R2014
1.8K
C2013
0.022
L2002
10m
R2012
7.5K
R2013
1K
C2010
10/16
R2106
1.6K
C2151
1000P
R2105
1K
J2005
L2151 1μ
B2101
2SC3399
SWITCH
Q2102
2SD1468S
SWITCH
R2114
2.2K
D2102
1SS133
R2113
10K
R2112
10K
D2101
1SS133
R2115
2.2K
R2111
10K
Q2101
2SD1468S
SWITCH
R2103
47K
R2104
43K
18K
R2101
47K
R2102
39K
AD(TU)
TO TN-A
AD(CV)
TO CV-A
ALWAYS 5V
SWD 12V
GND
TO PW-A
AV
A.MUTE+S.PLAY
PB
REC
TO SY-A
*1
*2
*3
*4

NOTE

	*1	*2	*3	*4
VR3721 VPS VR3701 VPS	R2051 1K	C2051 1000P	43K	L2151 · 1μ
VR3721 VR3701	J2012 LEAD JUMPER	NOT USE	43K	J2005 LEAD JUMPER
VR3721 LX VR3701 LX	J2012 LEAD JUMPER	NOT USE	. 18K	J2005 LEAD JUMPER

VOLTAGE : REC (PLAY) MODE

2-29. IC301 (LC66308A) SYSTEM CONTROL MPU PIN FUNCTIONS TABLE

NO.	Name	I/O	I/O Signal Function
1	FF + REW	O	Output during FF/REW.
2	POWER UP	O	Output when the power is ON. POWER ON : H
3	INPUT SELECT	O	Output when selecting an EE external input.
4	AV CTL or ANT/$\overline{\text{VTR}}$	O O	The same as the signal (PB H) for 8-pin Euro connector for selection of a RF converter output. Option by Pin 41.
5	REC H	O	REC indication signal. REC : H
6	PB H	O	PB image output indication signal. PB image : H
7	STILL + F.ADV	O	Broaden the H DOC pulse width during still frame advance.
8	A MUTE	O	Audio output inhibit indication signal. MUTE : H
9	$\overline{\text{SSB DATA}}$	I	For communications with the timer microprocessor. 8 bit × 12 block serial data.
10		O	
11	$\overline{\text{SSB CLK}}$	O	Clock pulse for SSB.
12	CTL PULSE	I	Approx. 25 Hz during REC/PB. Pulse for linear time counter. For discrimination of audio output mute while playing back the non-recorded portion.
13	$\overline{\text{CAP. FG PULSE}}$	I	Capstan FG signal. While checking the pulse width of this signal, the brake is applied to the capstan motor.
14	DOC PULSE	I	Noise feeding during STILL (PAUSE).
15	4K PWM	O	Outputs a 4 kHz PWM signal for approx. twelve seconds at the start of FF/REW to gradually start the tape running speed.
16	HOLD	I	+ 5V
17	ML F	O	For indicating the loading in FWD direction.
18	ML R	O	For indicating the loading in RVS direction.
19	TEST		GND
20	Vss		GND
21	OSC1		Clock oscillator (clock frequency of 4 MHz).
22	OSC2		
23	$\overline{\text{RESET}}$	I	Initial reset
24	$\overline{\text{ML L}}$	O	Loading motor low-speed indication signal
25	$\overline{\text{ML M}}$	O	Loading motor medium-speed indication signal
26	$\overline{\text{SW DATA 1}}$	I	Mechanical position switch
27	$\overline{\text{SW DATA 2}}$		
28	$\overline{\text{SW DATA 3}}$		
29	$\overline{\text{RF SE PULS}}$	I	25 Hz drum rotation detection during REC/PB. Takes timing during still noise feeding.
30	Mc BR	O	Capstan motor accelerating/decelerating signal Capstan motor brake Noise feeding during STILL
31	$\overline{\text{SV S DATA}}$	O	Serial data to servo microprocessor
32	$\overline{\text{SV S CLK}}$	O	Clock to the servo microprocessor
33	SAFTY SW	I	Erase prevention switch signal. With tab : L Without tab : H
34	FL START SW	I	Front loading (cassette loading) SW
35	V_REF	I	Reference voltage for internal comparator (for TAPE TOP S, TAPE END S ports)
36	REEL PULS	I	Reel table rotation detection
37	DEW SENSOR	I	Dew detection DEW : H
38	TAPE TOP S.	I	Tape winding start detection
39	TAPE END S.	I	Tape winding end detection
40	Vdd		5V
41	OPTION	I	For Pin 4 output selection 5V : AV CTL 2.5V : ANT/$\overline{\text{VTR}}$
42	TAPE SPEED	I	Tape speed discriminating data during PB (SP : LOW LP : HIGH)

P66308-0

2-30. IC351 (LC7416) DIGITAL SERVO IC PIN FUNCTIONS TABLE

Pin No.	I/O Terminal Name	I/O	Input/Output Function
1	FSC IN	I	Input for the IC internal system clock pulse. A level of at least 0.3 Vp-p is required. The color subcarrier signal is input by capacitive coupling.
2	V_{SS}		Ground
3	C-SYNC	I	Composite sync signal input.
4	VD	O	Dummy V_D signal output.
5	NC	—	NC
6	NC	—	
7	RF-SW-PULSE	O	Video head switching pulse output.
8	AF-SW-PULSE	O	Audio head (FM) switching pulse output.
9	DL1	I	Dummy V_D insertion position control CR.
10	CTL-IN	I	Control signal input.
11	REMAK	O	Outputs the control signal re-recording control signal. Three-value output (H, M, L).
12	REC-CTL	O	Recording control signal output. Three-value output (H, OPEN, L).
13	NC	—	NC
14	D-PG. MM	I	CR for drum PG signal delay.
15	D-PG	I	Drum PG signal input.
16	NC	—	NC
17	D-FG	I	Drum FG signal input.
18	DSE	O	Outputs the speed error for drum system speed control. An output making the drum motor stop is delivered when DRUM-ON is "0". The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
19	FHE	O	Outputs the horizontal sync signal of the composite sync signal after F-V conversion (using the drum phase control system). The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
20	DPE		Error output for drum system phase control. The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
21	C-START/STP	O	Outputs the capstan motor start and brake pulses in the slow mode.
22	CSE	O	Capstan system speed error output. An output making the capstan motor stop is delivered when CAP-ON is "0". The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
23	CPE	O	Capstan system phase reciprocal error output. The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
24	$\overline{\text{F}}$/R	O	Capstan motor forward/reverse control output. "1" sets the reverse mode, and "0" the forward mode.
25	C-FG1	I	Capstan FG signal input.
26	NC	—	NC
27	NC	—	NC
28	EP/LP/SP	O	Recording mode output. Three-value output ("H" is for EP mode, "M" for LP mode and "L" for SP mode).
29	SP	O	Recording mode output. "H" is for SP mode.
30	CAP-BRK	I	Control input for capstan brake timing. (MC-BR)
31	TRK-CR	I	CR for tracking adjustment.
32	NC	—	NC
33	D-WD1	I	CR for drum compensation timing adjustment in the slow mode.
34	NC	—	NC
35	REF-TRK	O	Outputs the tracking delay input signal.
36	MODE (× 2+STILL)	O	Mode decoding signal output. At the × 2 SPEED mode and starting time of SLOW/STILL mode, output "H" level.
37	NC	—	NC
38	1/0-CK	O	Outputs the CTL signal for realtime counter.
39	SV-S • CLK	I	Serial transmission clock pulse input.
40	SV-S • DATA	I	Serial data input terminal.
41	NTSC/$\overline{\text{PAL}}$	I	NTSC/PAL switching input. "H" is for NTSC, "L" for PAL.
42	V_{DD}		+ 5V supply terminal

LC7416

2-30. IC351 (LC7416) DIGITAL SERVO IC PIN FUNCTIONS TABLE

Pin No.	I/O Terminal Name	I/O	Input/Output Function
1	FSC IN	I	Input for the IC internal system clock pulse. A level of at least 0.3 Vp-p is required. The color subcarrier signal is input by capacitive coupling.
2	V_{SS}		Ground
3	C-SYNC	I	Composite sync signal input.
4	VD	O	Dummy V_D signal output.
5	NC	—	NC
6	NC	—	
7	RF-SW-PULSE	O	Video head switching pulse output.
8	AF-SW-PULSE	O	Audio head (FM) switching pulse output.
9	DL1	I	Dummy V_D insertion position control CR.
10	CTL-IN	I	Control signal input.
11	REMAK	O	Outputs the control signal re-recording control signal. Three-value output (H, M, L).
12	REC-CTL	O	Recording control signal output. Three-value output (H, OPEN, L).
13	NC	—	NC
14	D-PG. MM	I	CR for drum PG signal delay.
15	D-PG	I	Drum PG signal input.
16	NC	—	NC
17	D-FG	I	Drum FG signal input.
18	DSE	O	Outputs the speed error for drum system speed control. An output making the drum motor stop is delivered when DRUM-ON is "0". The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
19	FHE	O	Outputs the horizontal sync signal of the composite sync signal after F-V conversion (using the drum phase control system). The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
20	DPE		Error output for drum system phase control. The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
21	C-START/STP	O	Outputs the capstan motor start and brake pulses in the slow mode.
22	CSE	O	Capstan system speed error output. An output making the capstan motor stop is delivered when CAP-ON is "0". The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
23	CPE	O	Capstan system phase reciprocal error output. The lower three bits of the output data forms R-2R ladder network and the 4th bits for DAC (D/A Converter) and upper 5th to 8th bits for PWM (Pulse Width Modulation).
24	$\bar{\text{F}}$/R	O	Capstan motor forward/reverse control output. "1" sets the reverse mode, and "0" the forward mode.
25	C-FG1	I	Capstan FG signal input.
26	NC	—	NC
27	NC	—	NC
28	EP/LP/SP	O	Recording mode output. Three-value output ("H" is for EP mode, "M" for LP mode and "L" for SP mode).
29	SP	O	Recording mode output. "H" is for SP mode.
30	CAP-BRK	I	Control input for capstan brake timing. (MC-BR)
31	TRK-CR	I	CR for tracking adjustment.
32	NC	—	NC
33	D-WD1	I	CR for drum compensation timing adjustment in the slow mode.
34	NC	—	NC
35	REF-TRK	O	Outputs the tracking delay input signal.
36	MODE (×2+STILL)	O	Mode decoding signal output. At the ×2 SPEED mode and starting time of SLOW/STILL mode, output "H" level.
37	NC	—	NC
38	1/0-CK	O	Outputs the CTL signal for realtime counter.
39	SV-S • CLK	I	Serial transmission clock pulse input.
40	SV-S • DATA	I	Serial data input terminal.
41	NTSC/$\overline{\text{PAL}}$	I	NTSC/PAL switching input. "H" is for NTSC, "L" for PAL.
42	V_{DD}		+5V supply terminal

LC7416

2-31. IC711 (M50958) TIMER MPU PIN FUNCTIONS TABLE

Pin No.	Port	Input/Output Signal	I/O	Input/Output Function
1	Vcc			+5V
2	$P6_5$	$\bar{\text{I}}$/BG	O	PAL transmission system switching ("L" = PAL I ; "H" = PAL BG)
3	$P6_4$		–	
4	$P6_3$/PWM3	BAND1	O	Band data output (BAND1, BAND2) (L, L) = VHF-LOW (L, H) = VHF-HIGH (H, L) = UHF (H, H) = SKIP
5	$P6_2$/PWM2	BAND2	O	
6	$P6_1$/PWM1	PWM	O	Tuning voltage output. (PWM signal)
7	$P6_0$/T	ADJUST	O	Pulse output (32.768kHz/1024 = 32Hz) for clock frequency adjustment.
8	$P2_7$	$\overline{\text{CLK}}$	O	Clock pulse output to the E² PROM.
9	$P2_6$	DI	I/O	Data exchange with the E² PROM.
10	$P2_5$	$\overline{\text{E}^2\text{ PROM CS1}}$	O	E² PROM 1 is accessed when "L".
11	$P2_4$	$\overline{\text{PAL}}$/SECAM	O	Transmission system switching ("L" = PAL ; "H" = SECAM).
12	$P2_3$	VIDEO MUTE	O	"H" output during VIDEO MUTE
13	$P2_2$	TUNER ON	O	"H" output when tuner power is ON.
14	$P2_1$	$\overline{\text{AUDIO MUTE}}$	O	"L" output during AUDIO MUTE.
15	$P2_0$	AFT MUTE	O	"H" output during AFT MUTE.
16	$P3_7$/$\overline{\text{Srdy}}$	$\overline{\text{CH +}}$	O	CH + system switching ("L" = CH + ON)
17	$P3_6$/CLK	$\overline{\text{S.CLK}}$	I	SSB clock pulse input.
18	$P3_5$/Sout	$\overline{\text{S.OUT}}$	O	SSB data output.
19	$P3_4$/Sin	S.IN	I	SSB data input.
20	$P3_3$/ANin	AFT.C	I	AFT.S curve input.
21	$P3_2$/CNTR	H.SYNC	I	Sync. detection signal input for existing channel discrimination. ("L" = Existing Sync.)
22	$P3_1$	SCL	O	Clock pulse output to the VPS decoder IC.
23	$P3_0$	SDA	I/O	Data exchange with the VPS decoder IC.
24	$P5_3$/INT_1	$\overline{\text{POWER DOWN}}$	I	Power failure mode set at "L" input.
25	$P5_2$/INT_2	IR SIG. IN	I	Remote control signal input.
26	CNVss			Ground.
27	$\overline{\text{RESET}}$			Reset terminal.
28	Xin			6MHz clock terminal.
29	Xout			
30	Xcin			32.768kHz (clock OSC used in the power failure mode)
31	Xcout			
32	Vss			Ground
33	φ			
34	$P5_7$	KEY IN4	I	Key inputs
35	$P5_6$	KEY IN3	I	
36	$P5_5$	KEY IN2	I	
37	$P5_4$	KEY IN1	I	
38	Vp	Vp		-30V
39	$P5_1$	STEREO R	O	2-bit signal output for AUDIO OUTPUT SELECT and audio output display indication according to table below.
40	$P5_0$	STEREO L	O	
41	$P1_7$	o	O	Display segment outputs. (Included key-scan output)
42	$P1_6$	n	O	
43	$P1_5$	m	O	
44	$P1_4$	l	O	
45	$P1_3$	k	O	
46	$P1_2$	j	O	
47	$P1_1$	i	O	
48	$P1_0$	G9	O	Display grid outputs.
49	$P0_7$	G8	O	
50	$P0_6$	G7	O	
51	$P0_5$	G6	O	
52	$P0_4$	G5	O	
53	$P0_3$	G4	O	
54	$P0_2$	G3	O	
55	$P0_1$	G2	O	
56	$P0_0$	G1	O	
57	$P4_7$	h	O	Display segment outputs. (Included key-scan output)
58	$P4_6$	g	O	
59	$P4_5$	f	O	
60	$P4_4$	e	O	
61	$P4_3$	d	O	
62	$P4_2$	c	O	
63	$P4_1$	b	O	
64	$P4_0$	a	O	

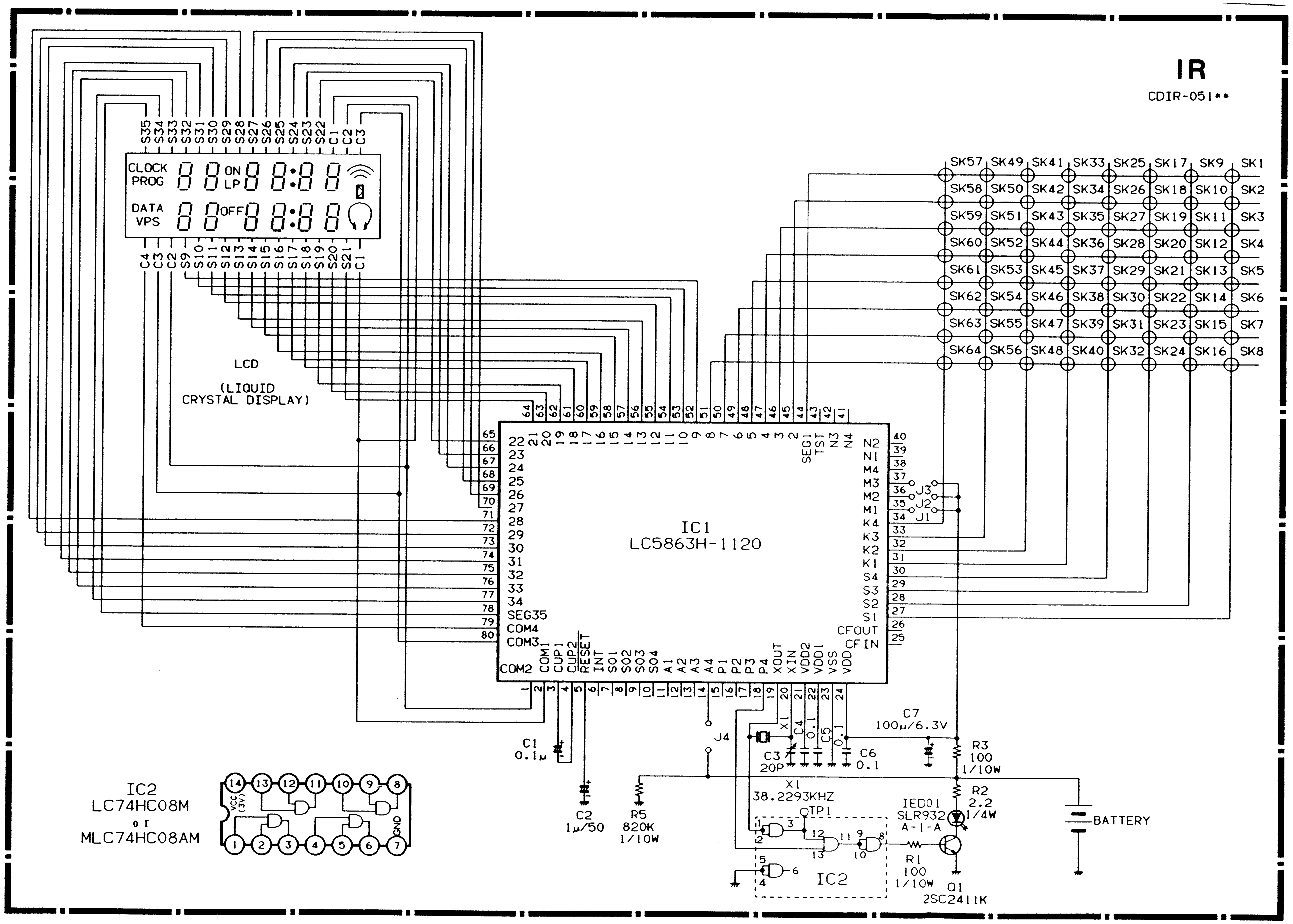
NOTE : Clock frequency check with ADJUST terminal of Pin 7.

1. Connect the anode of the diode (IS188 etc.) to Pin 44 (key-scan l) and the cathode to Pin 37 (KEY IN 1). Then ground the Pin 27 ($\overline{\text{RESET}}$) terminal once and reset the microcomputer.
2. The clock frequency (32 Hz) can be observed with the ADJUST terminal of Pin 7 according to the servicing above.
3. In order to set normal function mode again, ground the terminal of Pin 27 ($\overline{\text{RESET}}$) once and reset the microcomputer after removing the diode connected to Pins 44 and 37.

PORT \ MODE	NORMAL	MAIN	SUB	STEREO
STEREO R (Pin 39)	L	L	H	H
STEREO L (Pin 40)	L	H	L	H

P50958V0

2-32. IR REMOTE CONTROL CIRCUIT DIAGRAM

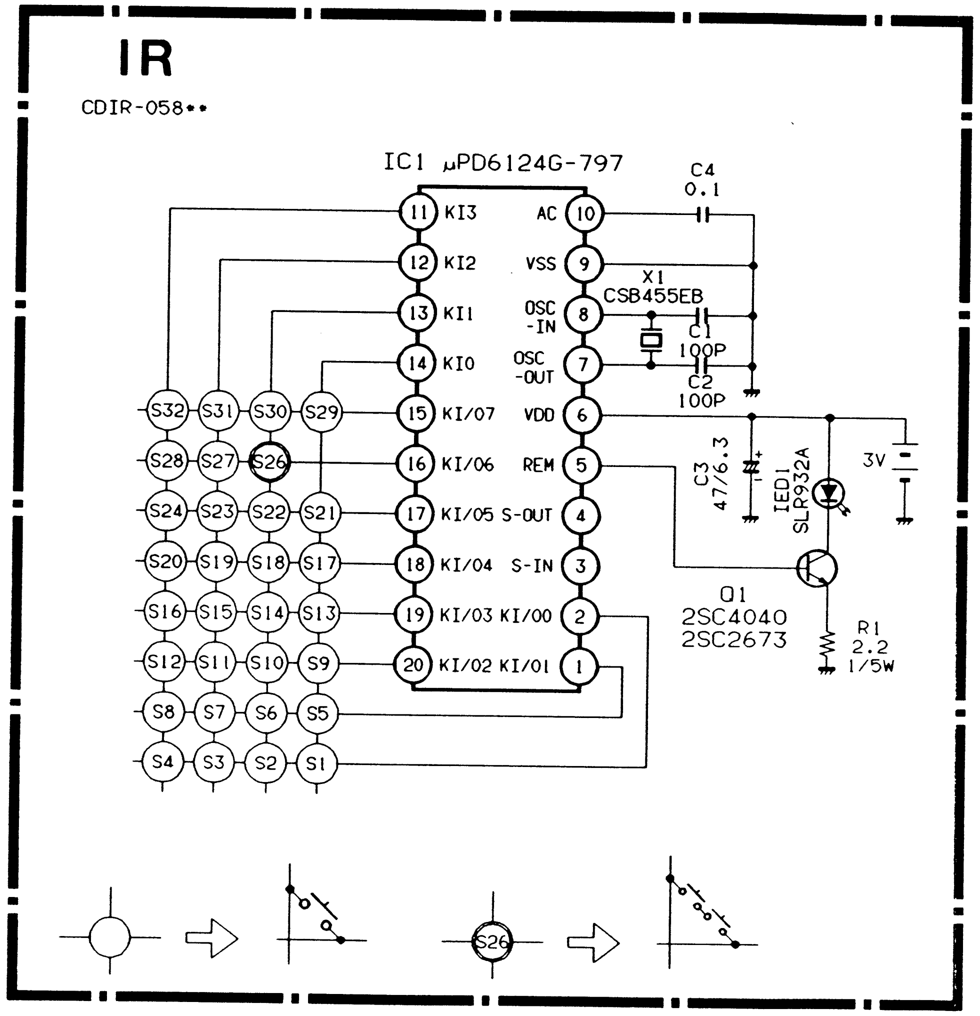

IR
CDIR-051••
LCD
(LIQUID CRYSTAL DISPLAY)
CLOCK
PROG
DATA
VPS
ON
LP
OFF
IC1
LC5863H-1120
SEG35
COM4
COM3
COM2
COM1
CUP1
CUP2
RESET
INT
CFOUT
CFIN
XOUT
XIN
VDD2
VDD1
VSS
VDD
SEG1
TST
J1
J2
J3
J4
SK57 SK49 SK41 SK33 SK25 SK17 SK9 SK1
SK64 SK56 SK48 SK40 SK32 SK24 SK16 SK8
C1 0.1μ
C2 1μ/50
R5 820K 1/10W
C3 20P
X1 38.2293KHZ
C4 0.1
C5 0.1
C6 0.1
C7 100μ/6.3V
R3 100 1/10W
R2 2.2 1/4W
IED01 SLR932 A-1-A
R1 100 1/10W
Q1 2SC2411K
TP1
IC2
BATTERY
IC2
LC74HC08M
or
MLC74HC08AM
VCC (3V)
GND

AVAILABLE KEY FUNCTION OF REMOTE CONTROL UNIT

KEY NO.	FUNCTION	VR3721 VPS VR3721	VR3721 LX
1	II PAUSE	USE	USE
2	■ STOP	USE	USE
3	MODE -		
4	● REC	USE	USE
5		USE	USE
6	MODE +		
7	SEARCH		
8	SLOW		
9	▶▷FF	USE	USE
10	▶ PLAY	USE	USE
11	BLANK	USE	USE
12	◁◀REW	USE	USE
13	A.TR		
14	C.DISP		
15	CODE	USE	USE
16	▷0◁ RESET	USE	USE
17	EJECT		
18	R.PLAY		
19	X2S		
20	A.DUB		
21	INSERT		
22	↓		
23	MARK		
24	✉ CNT M	USE	USE
25	←CH +	USE	USE
26	0-AV	USE	USE
27	→CH -	USE	USE
28	A.SEL		
29	Ᵽ✉ CANCEL	USE	USE
30	←		
31	↑		
32	→		
33	9	USE	USE
34	8	USE	USE
35	7	USE	USE
36	SC		
37	P◷ CLOCK	USE	USE
38	SIZE		
39	ART		
40	INST		
41	6	USE	USE
42	5	USE	USE
43	4	USE	USE
44	SP/LP		
45	✉V CHECK	USE	USE
46	CHSCAN		
47	OK		
48	M.STILL		
49	3	USE	USE
50	2	USE	USE
51	1	USE	USE
52	VPS	USE	
53	✉R PROG	USE	USE
54	M.CALL		
55	OSD		
56	ERASE		
57	■))) TRANS	USE	USE
58	ZOOM		
59	MONITOR		
60	VCR/TV		
61	◉ POWER	USE	USE
62	PRESET		
63	NR		
64	MUTE		

IR-05107•

2-33. IR REMOTE CONTROL CIRCUIT DIAGRAM

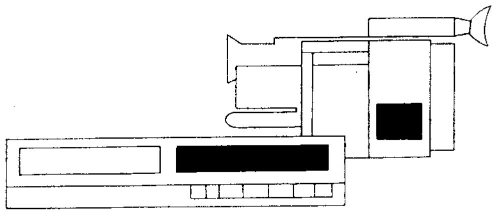

IR
CDIR-058••
IC1 μPD6124G-797
KI3
KI2
KI1
KI0
KI/07
KI/06
KI/05
KI/04
KI/03
KI/02
AC
VSS
OSC -IN
OSC -OUT
VDD
REM
S-OUT
S-IN
KI/00
KI/01
C4 0.1
X1 CSB455EB
C1 100P
C2 100P
C3 47/6.3
IED1 SLR932A
3V
Q1 2SC4040 2SC2673
R1 2.2 1/5W
S1 S2 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S18 S19 S20 S21 S22 S23 S24 S26 S27 S28 S29 S30 S31 S32
S26

AVAILABLE KEY FUNCTION OF REMOTE CONTROL UNIT

KEY NO	FUNCTION	VR3701 VPS VR3701	VR3701 LX
S1	◉ POWER	USE	USE
S2	VTR/TV		
S3	▷0◁ RESET	USE	USE
S4	▭ MEMORY	USE	USE
S5	P ✉ PROG	USE	USE
S6	1	USE	USE
S7	2	USE	USE
S8	3	USE	USE
S9	P. ◷ CLOCK	USE	USE
S10	4	USE	USE
S11	5	USE	USE
S12	6	USE	USE
S13	VPS	USE	
S14	7	USE	USE
S15	8	USE	USE
S16	9	USE	USE
S17	P̸ ✉ CANCEL	USE	USE
S18	←	USE	USE
S19	0-AV	USE	USE
S20	→	USE	USE
S21	BLANK	USE	USE
S22	◁◀ REW	USE	USE
S23	▶ PLAY	USE	USE
S24	▶▷ FF	USE	USE
S26	● REC	USE	USE
S27	■ STOP	USE	USE
S28	‖ PAUSE	USE	USE
S29	SP/LP		
S30	REMAIN		
S31	TRACK		
S32	MONITOR		

IR-05805+

NOKIA
CONSUMER ELECTRONICS



VR

. 1990

NOKIA UNTERHALTUNGSELEKTRONIK GmbH
Service, Östliche 132, Postfach 1526
D-7530 Pforzheim

Service-Manual

ITT NOKIA

VR 3701
VR 3701 VPS
VR 3721
VR 3721 VPS

Luxor

VR 3701 LX
VR 3721 LX

(D) Schaltbilder, Leiterplatten, Ersatzteile-Liste

Elektrischer Abgleich und Mechanik-Justagen, siehe Rückseite

⚠ **Sicherheitsbauteil!**
Dieses Symbol kennzeichnet in den Schaltbildern alle Bauteile, die nur durch Originalteile ersetzt werden dürfen.

Bei Reparaturen gültige Sicherheitsvorschriften beachten!

(GB) Circuit diagrams, P.C.B., spare parts list

Electrical alignment and mechanical adjustments, see rear page

⚠ **Safety Component!**
This symbol identifies in the circuit diagrams all safety critical parts. Replace only with specified part numbers.

Service and repair work to be performed only in accordance with existing safety regulations!

(F) Schémas, circuits imprimés, liste des pièces détachées

Alignement et mécanique ajustages, voir page précédante

⚠ **Composant de protection!**
Ce symbol indique tous les composants dans les schémas, qui doivent être remplacés uniquement par des pièces d'origines.

Pendant le dépannage respecter les régulations du sécurité!

Änderungen vorbehalten
Modifications reserved
Modifications réservées

6611 77 04
(611) SA

Liste der Service-Manuale
Liste of Service Manuals
Liste des manuals

	Modell Model Modèle	Schaltbilder, Leiterplatten, Ersatzteile-Liste Circ. diagr., P.C.B.,spare parts list Schémas circ. imprimés, liste des pièces détachées No.	Elektrischer Abgleich Electrical alignment Alignement No.	Mechanik-Justagen Mechanical adjustments Mécanique ajustages No.
ITT NOKIA	VR 3701 VPS	6611 77 04	6611 77 05	6611 77 06
LUXOR	VR 3701 LX			
ITT NOKIA	VR 3701			
ITT NOKIA	VR 3721 VPS			
LUXOR	VR 3721 LX			
ITT NOKIA	VR 3721			
ITT NOKIA	VR 3701 UK	6611 77 07		
ITT NOKIA	VR 3701 V			
ITT NOKIA	VR 3721 UK			
ITT NOKIA	VR 3701 H	6611 77 08		
ITT NOKIA	VR 3731 VPS	6611 77 09	6611 77 10	
ITT NOKIA	VR 3731			
LUXOR	VR 3731 LX			
ITT NOKIA	VR 3731 UK	6611 77 11		
ITT NOKIA	VR 3761 HIFI VPS	6611 77 12	6611 77 13	
ITT NOKIA	VR 3761 HIFI NICAM	6611 77 14		
LUXOR	VR 3761 HIFI NICAM LX			
ITT NOKIA	VR 3761 HIFI UK	6611 77 15		
ITT NOKIA	VR 3781 HIFI VPS	6611 77 16	6611 77 17	
ITT NOKIA	VR 3781 HIFI NICAM	6611 77 18		
LUXOR	VR 3781 HIFI NICAM LX			
OCEANIC	VR 3721 S	6611 77 19	6611 77 20	
OCEANIC	VR 3701 S			
OCEANIC	VR 3741 MS	6611 77 21		
OCEANIC	VR 3751 MS	6611 77 22	6611 77 23	

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COMPL, VP-1 12
COMPL, PW-1 12
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COMPL, TM-1 13
COMPL, TM-2 14
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COMPL, RM-1 15
REMOCON 16
COMPL, RM-1 16
CIRCUIT DIAGRAM

NOTE: 1. Parts order must contain Model Number, Part Number and DescriptioN.
2. N.S.P. : Not avilable as service parts.

LOCATION	PARTS NO.	DESCRIPTION
ACCESSORIES		
	613 110 3481	REMOCON,RC221(VR 3721 VPS,3721)
OR	613 111 3565	REMOCON(VR 3701 VPS,3701)
OR	613 110 3504	REMOCON,RC521(VR 3721 LX)
OR	613 111 3572	REMOCON(VR 3701 LX)
	613 111 3824	INSTRUCTION MANUAL(VR 3721 VPS)
OR	613 111 3817	INSTRUCTION MANUAL(VR 3701 VPS)
OR	613 111 3848	INSTRUCTION MANUAL(VR 3701)
OR	613 111 3886	INSTRUCTION MANUAL(VR 3721 LX)
OR	613 111 3879	INSTRUCTION MANUAL(VR 3701 LX)
OR	613 111 3855	INSTRUCTION MANUAL(VR 3721)
	613 077 4415	CABLE,ANT(VR 3721 VPS,3701 VPS)
OR	613 096 6773	CABLE,ANT (EXCEPT VR 3721 VPS,3701 VPS)
	613 089 2911	GUARANTEE CARD (EXCEPT VR 3721 LX,3701 LX)

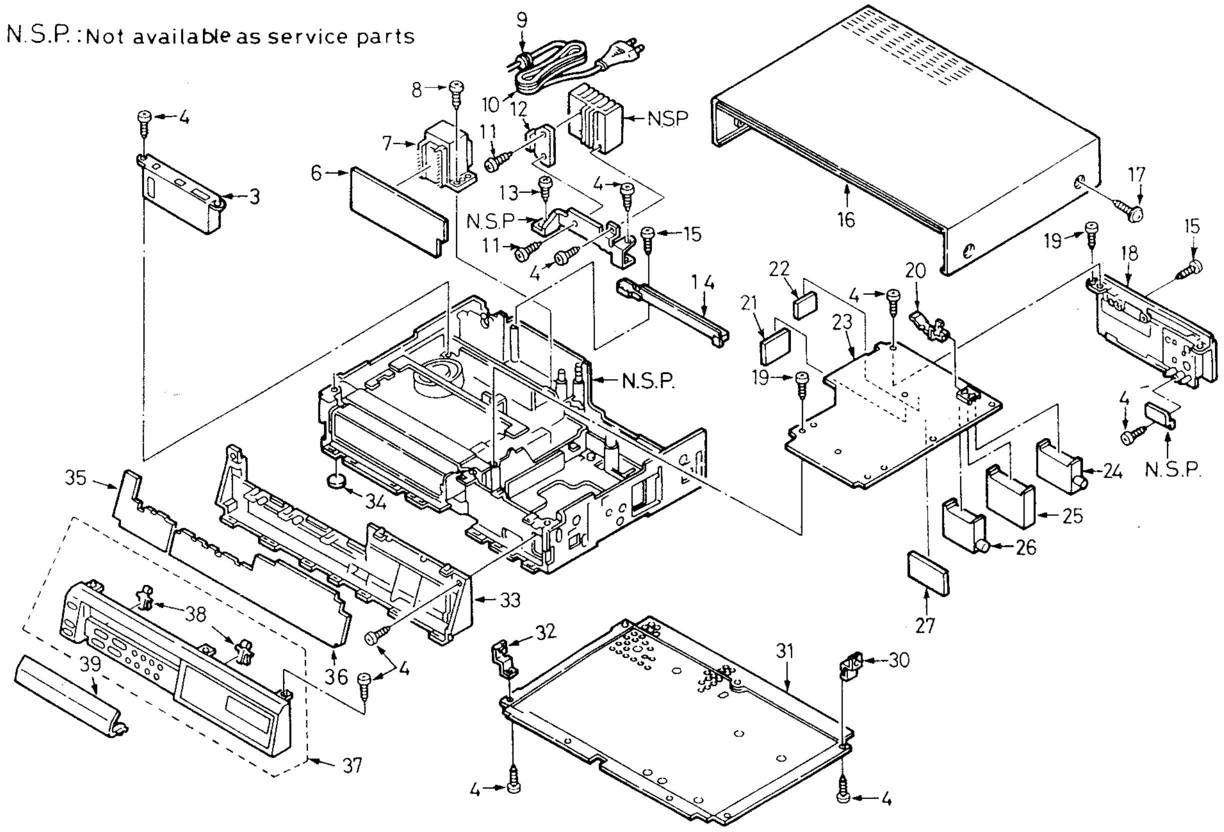
LOCATION	PARTS NO.	DESCRIPTION
PACKING MATERIALS		
	613 093 7735	CORR CASE,INNER
	613 077 4507	CUSHION INNER,FRONT
	613 077 4514	CUSHION INNER,BACK
	613 111 2971	BAR CODE LABEL(VR 3721 VPS)
OR	613 111 4555	BAR CODE LABEL(VR 3701 VPS)
OR	613 111 4562	BAR CODE LABEL(VR 3721)
OR	613 111 4579	BAR CODE LABEL(VR 3701)
OR	613 087 7598	BAR CODE LABEL(VR 3721 LX,3701 LX)
	613 095 1229	POLYE COVER,INNER

CABINET & CHASSIS PARTS

LOCATION		PARTS NO.	DESCRIPTION
3		613 117 0735	COMPL.VP-1(VR 3721 VPS,3701 VPS)
OR		613 117 0728	COMPL.VP-1 (EXCEPT VR 3721 VPS,3701 VPS)
4		411 137 0007	SCR L-TPG BIN 3X10
6		613 108 8771	COMPL.PW-1(VR 3721 VPS,3701 VPS)
OR		613 108 4209	COMPL.PW-1 (EXCEPT VR 3721 VPS,3701 VPS)
7	⚠	613 108 4094	TRANS,POWER,T5001
OR	⚠	613 108 5428	TRANS,POWER,T5001
8		411 021 9604	SCR S-TPG BIN 4X8
9	⚠	613 053 6686	FIXER
10	⚠	613 086 0507	CORD,POWER
OR	⚠	613 086 2150	CORD,POWER
11		411 021 4500	SCR S-TPG BIN 3X16
12		613 108 4216	COMPL,PW-2
13		411 021 5705	SCR S-TPG BIN 3X6
14		613 077 3487	BLIND
15		411 021 3701	SCR S-TPG BIN 3X10
16		613 112 2017	COVER,TOP
17		412 024 7604	SPECIAL SCREW
18		613 110 0152	TERMINAL(INCLUDE CP-A)
19		411 021 3800	SCR S-TPG BIN 3X10
20		613 059 4198	SPRING PLATE
21		613 108 4186	COMPL,VD-1
22		613 108 5534	COMPL,TM-8,VPS PCB (VR 3721 VPS,3701 VPS)

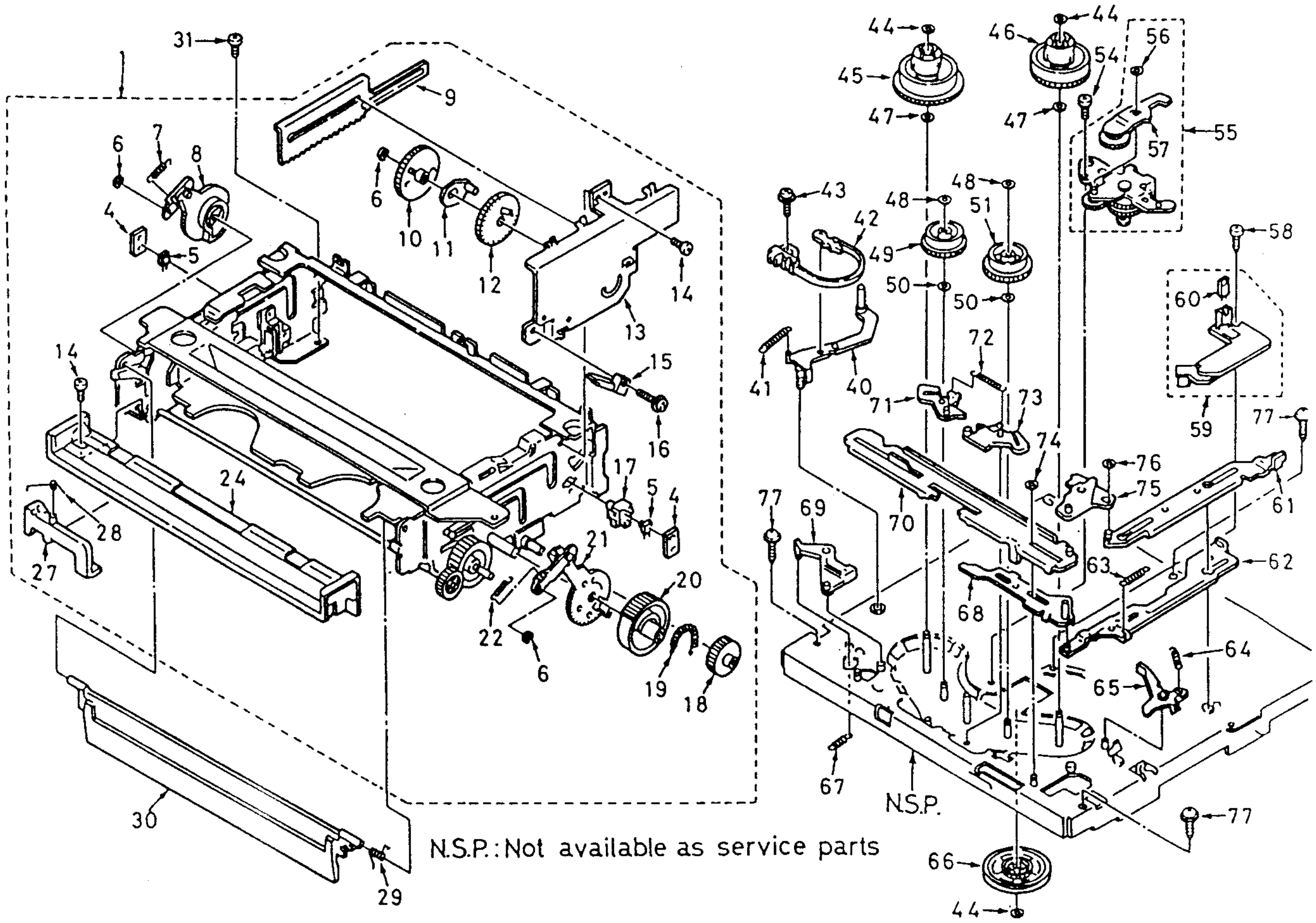
LOCATION	PARTS NO.	DESCRIPTION
23	613 110 2064	COMPL,CP-A(VR 3721 VPS)
OR	613 112 1843	COMPL,CP-A(VR 3701 VPS)
OR	613 110 2071	COMPL,CP-A(VR 3721)
OR	613 110 2088	COMPL,CP-A(VR 3701)
OR	613 110 2095	COMPL,CP-A(VR 3721 LX)
OR	613 112 1850	COMPL,CP-A(VR 3701 LX)
24	613 080 5836	MODULATOR,RF
OR	613 093 2990	MODULATOR,RF
25	613 107 0547	IF PACK
26	613 113 7974	TUNER PACK
27	613 109 1030	COMPL,TN-7
30	613 048 6912	BRACKET
31	613 022 0578	COVER,BOTTOM
32	613 022 0738	BRACKET,CABINET
33	613 077 2527	FRAME
34	613 047 1772	STAND
35	613 110 1814	COMPL,TM-2
36	613 110 1791	COMPL,TM-1
37	613 111 3381	ASSY,CABINET,FRONT(VR 3721 VPS)
OR	613 111 5101	ASSY,CABINET,FRONT(VR 3701 VPS)
OR	613 111 5118	ASSY,CABINET,FRONT(VR 3721)
OR	613 111 5125	ASSY,CABINET,FRONT(VR 3701)
OR	613 111 5163	ASSY,CABINET,FRONT(VR 3721 LX)
OR	613 111 5170	ASSY,CABINET,FRONT(VR 3701 LX)
38	613 048 2884	LOCK
39	613 111 3442	ASSY,DOOR

N.S.P. :Not available as service parts



MECHANISM PARTS 1

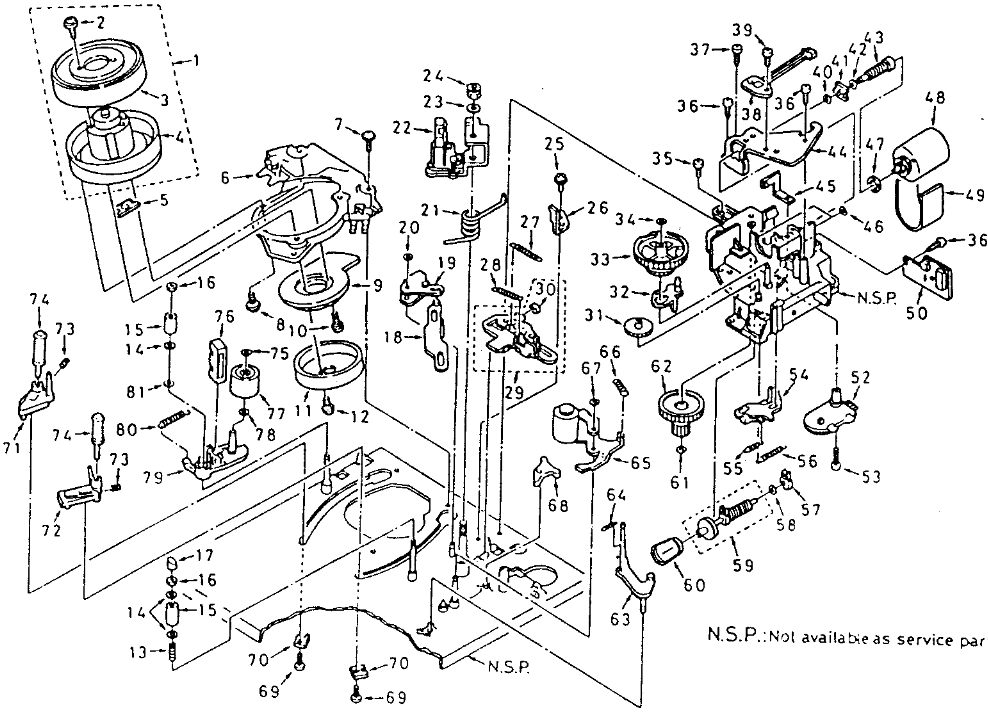
LOCATION	PARTS NO.	DESCRIPTION
1	613 087 4412	COMPL,CASSETTE MECHA
4	613 022 0585	LID
5	407 098 3201	PHOTO COUPLE PN150SAN
6	411 015 9801	RING E 2.3
7	613 022 1643	SPRING,LINK L
8	613 022 0073	ASSY,GEAR,LEVER L
9	613 022 2695	RACK
10	613 022 2633	GEAR,LOCK
11	613 021 9916	ASSY,LEVER,PINION
12	613 022 2626	GEAR,PINION
13	613 021 9657	ASSY,BRACKET,GEAR
14	411 027 1305	SCR S-TPG BIN 2.6×4
15	613 006 4479	SPECIAL SWITCH
OR	613 095 0949	SPECIAL SWITCH
16	411 106 9208	SCR PAN+SW+W 2×9
17	613 022 0936	HOLDER,TRANSISTOR
18	613 022 2619	GEAR,IDLER
19	613 022 1667	SPRING,GEAR MAIN
20	613 022 2596	GEAR,MAIN
21	613 022 0097	ASSY,GEAR,LEVER R
22	613 022 1674	SPRING,LINK R
24	613 022 4064	BOARD,UNDER
27	613 022 2237	LEVER,SAFETY SWITCH
28	613 022 1827	SPRING,SAFETY SWITCH
29	613 022 1803	SPRING,DOOR
30	613 110 7458	CASSETTE DOOR
31	411 001 8702	SCR BIN 3×6
40	613 100 0391	ASSY,LEVER,TENSION
41	613 085 7996	SPRING,LEVER TENSION
42	613 021 9701	ASSY,HOLDER,BAND
43	411 036 2805	SCR PAN+SW+W 2.6×6
44	411 109 1605	WASHER Y 2.6×6×0.25
45	613 022 0127	ASSY,REEL,SUPPLY
46	613 022 0110	ASSY,REEL,TAKE UP
47	412 021 5306	SPECIAL WASHER 3.1×6×0.3
OR	412 015 8900	SPECIAL WASHER 3.1×6×0.4
OR	412 015 8504	SPECIAL WASHER 3.1×6×0.5
48	411 109 1506	WASHER Y 2.1×6×0.25
OR	411 109 1407	WASHER Y 2.1×5×0.25
49	613 098 7174	GEAR,REEL SUPPLY
50	412 026 7305	SPECIAL WASHER 2.6×6×0.25
51	613 098 7181	GEAR,REEL TAKE UP
54	411 031 0905	SCR BIN 2.6×4
55	613 085 7101	COMPL,IDLER,CLUTCH
56	411 120 1301	WASHER Y 2.1×4×0.25
57	613 022 0134	ASSY,IDLER
58	411 021 3107	SCR S-TPG BIN 2.6×8
59	613 078 6302	COMPL,MC-4
60	407 016 7205	LED LN59
61	613 021 9985	ASSY,SLIDE,ACT PLATE
62	613 112 8088	SLIDE,CONTROL BRAKE
OR	613 021 9992	ASSY,SLIDE,C BRAKE
63	613 022 1612	SPRING,RETURN SLIDE
64	613 022 1506	SPRING,SUB T
65	613 098 0106	ASSY,BRAKE,SUB T
66	613 077 3647	PULLEY,REEL
67	613 022 1490	SPRING,SUB SUPPLY
68	613 022 2374	SLIDE,ACT BRAKE
69	613 084 8871	BRAKE,SUB SUPPLY
70	613 022 0004	ASSY,SLIDE,M PLATE
71	613 080 9216	ASSY,BRAKE,SUPPLY
72	613 086 2914	SPRING,MAIN BRAKE
73	613 080 9209	ASSY,BRAKE,TAKE UP
74	411 109 3005	WASHER Y 2.6×5×0.5
75	613 022 2015	LEVER,CONT PLATE
76	412 015 9501	SPECIAL WASHER
77	411 021 7907	SCR S-TPG BIN 4×12



N.S.P.: Not available as service parts

MECHANISM PARTS 2

LOCATION	PARTS NO.	DESCRIPTION
1	613 078 8665	COMPL,CYLINDER,2N2P-V
OR	613 087 6843	COMPL,CYLINDER,2N2P-V
2	411 038 1608	SCR PAN+W 3×8
3	613 078 8672	ASSY,CYLINDER,UPR 2N2P-V
OR	613 087 6850	ASSY,CYLINDER,UPR 2N2P-V
4	613 022 0271	ASSY,CYLINDER,LWR 2
OR	613 077 2138	ASSY,CYLINDER,LWR 2
5	613 081 4036	SPACER,MOTOR
6	613 022 1001	BASE,CYLINDER
OR	613 088 9072	BASE,CYLINDER
7	411 047 7509	SCR PAN+FLG 3×6
8	411 047 5000	SCR PAN+FLG 2.6×8
OR	412 030 9708	SPECIAL SCREW 2.6×8
9	613 085 7279	STATOR,MOTOR CYLINDER
10	411 044 9209	SCR PAN+SW 2.3×8
OR	411 044 8301	SCR PAN+SW 2.3×10
11	613 022 4019	ROTOR,MOTOR CYLINDER
12	411 044 9001	SCR PAN+SW 2.3×6
13	613 022 1766	SPRING,ADJUST GUIDE
14	613 053 3227	SPECIAL WASHER
15	613 058 3307	TAPE GUIDE
16	412 026 2607	SPECIAL NUT (M3)
17	613 085 2434	CAP
18	613 021 9961	ASSY,SLIDE,ACT PINCH
19	613 021 9800	ASSY,LEVER,CAM PINCH
20	411 109 2008	WASHER Y 3.1×8×0.5
21	613 022 1797	SPRING,ACE HEAD
22	613 021 9640	COMPL,BRACKET,HEAD
23	613 051 4615	SPACER
OR	613 110 1692	SPACER
24	412 015 8207	SPECIAL NUT (M5)
25	411 120 0007	SCR PAN+SW+W 2.6×5
26	613 022 0752	BRACKET,STOPPER
27	613 022 1575	SPRING,LINK LOCK
28	613 022 1582	SPRING,SLIDE BRAKE
29	613 094 9233	ASSY,SLIDE,CAM
30	613 022 2725	DAMPER
31	613 022 2534	GEAR,FRONT LOAD
32	613 094 1206	ASSY,LEVER,FRONT
33	613 077 3586	GEAR,HELICAL FRONT
33	613 027 0504	WASHER 4.1×6.5×R5T
35	411 046 8002	SCR PAN+SW+W 2.6×6
36	411 023 2801	SCR S-TPG PAN 2.6×6
37	411 021 3107	SCR S-TPG BIN 2.6×8
38	613 089 4328	ASSY,SENSOR,DEW
39	411 040 2303	SCR PAN 2.6×5
40	613 053 2381	SPECIAL WASHER
41	613 077 3227	HOLDER,WORM
42	613 027 0382	WASHER
43	613 078 8320	ASSY,WORM,FRONT
44	613 117 0599	BRACKET,HOLDER
OR	613 111 8522	BRACKET,HOLDER
OR	613 110 1203	BRACKET,HOLDER
OR	613 092 5862	BRACKET,HOLDER
45	613 093 9159	PLATE,NUT
46	613 093 8374	DAMPER,MOTOR
47	613 077 3616	DAMPER,WORM
48	613 021 9527	ASSY,LOADING MOTOR
49	613 092 9945	DAMPER,MOTOR
50	613 107 2732	COMPL,MC-3
52	613 110 0374	ROTARY SWITCH
53	411 126 5303	SCR PAN 2.6×13
54	613 092 9921	ASSY,SLIDE,FRONT
55	613 092 5985	SPRING,LEVER LOAD
56	613 092 5992	SPRING,LEVER ACT
57	613 092 5886	HOLDER,WORM
58	613 027 0627	WASHER 2.1×6×0.5
59	613 092 9938	ASSY,WORM,LOAD
60	613 022 2985	BELT,LOADING
61	412 033 4106	WASHER SLIT 2.6×5×0.5
62	613 077 3579	GEAR,HELICAL
63	613 102 9293	ASSY,LEVER,REV GUIDE
64	613 022 1568	SPRING,REVIEW LEVER
65	613 022 0158	COMPL,PINCH ROLLER
66	613 022 1483	SPRING,PINCH ROLLER
67	411 109 2107	WASHER Y 3.6×6×0.5
68	613 078 8160	COMPL,LEVER,ACT BRAKE
69	411 031 1209	SCR BIN 2.6×5
70	613 022 1919	PLATE,GUIDE
71	613 021 9725	ASSY,BASE,ROLLER S
72	613 021 9732	ASSY,BASE,ROLLER T
73	411 063 0904	SCR SET HEX-SCT 2×3
74	613 022 0233	ASSY,GUIDE,ROLLER
75	411 109 2602	WASHER Y 1.5×4×0.25
76	613 022 4224	HEAD,FULL ERASE
77	613 022 2817	IMPEDACE ROLLER
78	412 032 5807	SPECIAL WASHER 2.1×5×0.13
79	613 093 8305	ASSY,LEVER,FE HEAD
80	613 022 1698	SPRING,ERASE HEAD
81	411 109 1704	WASHER Y 6.4×10×0.25

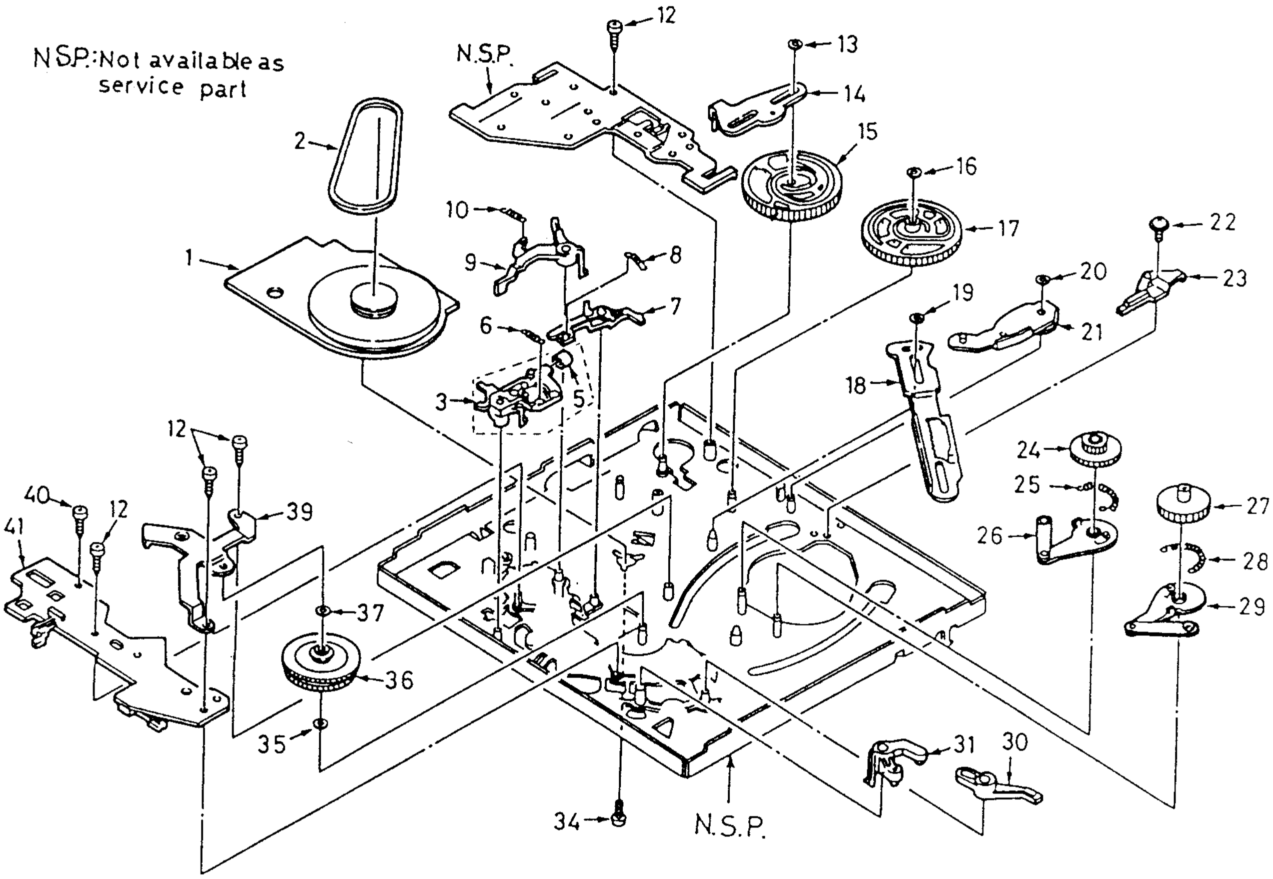


N.S.P.:Not availableas service parts

MECHANISM PARTS 3

LOCATION	PARTS NO.	DESCRIPTION
1	613 087 8854	MOTOR,CAPSTAN
2	613 022 2978	BELT,REEL DRIVE
3	613 021 9848	ASSY,LEVER,CLUTCH
5	613 079 1023	DAMPER,LEVER CLUTCH
6	613 022 1520	SPRING,LEVER CLUTCH
7	613 082 3434	LEVER,CHANGE CLUTCH
8	613 022 1711	SPRING,CHANGE CLUTCH
9	613 088 5470	ASSY,BRAKE CAPSTAN
10	613 092 7156	SPRING,CAPSTAN
12	411 021 3107	SCR S-TPG BIN 2.6×8
13	411 109 2008	WASHER Y 3.1×8×0.5
14	613 021 9978	ASSY,SLIDE,CAM PLATE
15	613 022 2701	CAM,MODE
16	411 109 1902	WASHER Y 3.1×6×0.5
17	613 022 2718	CAM,MAIN
18	613 022 2664	RACK,LOAD
19	411 109 1803	WASHER Y 2.6×6×0.5
20	411 109 2107	WASHER Y 3.6×6×0.5
OR	411 109 2206	WASHER Y 3.6×8×0.5
21	613 021 9794	ASSY,LEVER,CAM LOAD
22	411 047 6809	SCR PAN+FLG 3×4
23	613 021 9763	ASSY,EARTH,CYLINDER
24	613 090 6380	GEAR,LOAD TAKE UP
25	613 022 1551	SPRING,GEAR LOAD T
26	613 021 9879	ASSY,LEVER,LOAD T
27	613 090 6373	GEAR,LOAD SUPPLY
28	613 022 1704	SPRING,GEAR LOAD S
29	613 021 9862	ASSY,LEVER,LOAD S
30	613 022 2039	LEVER,RETURN TENSION
31	613 091 3104	ASSY,LEVER CONTROL
34	411 040 2303	SCR PAN 2.6×5
35	412 015 8603	SPECIAL WASHER 3.1×6×0.25
36	613 102 0900	ASSY,GEAR,FRICTION
37	411 109 1605	WASHER Y 2.6×6×0.25
39	613 079 8121	BRACKET,PULLEY
40	411 100 0300	SCR S-TPG BIN 2.6×5
41	613 110 1340	COMPL,MC-1
R1	401 026 0607	CARBON 270 JA 1/6W
OR	401 017 0708	CARBON 270 JA 1/4W
R2	401 024 6700	CARBON 100 JA 1/6W
OR	401 012 4404	CARBON 100 JA 1/4W
D1	407 094 1300	PHOTO COUPLE SPI-315-04-C
OR	407 043 0101	PHOTO DIODE ON2170-R
SW1	613 022 4545	SPECIAL SWITCH,EP

N.S.P:Not available as service part



ELECTRICAL PARTS

NOTE;

*Materials of Capacitors and Resistors are abbreviated as follows;

Resistors	
MT-FILE	Metal Film Resistor
MT-GLAZE	Metal Glaze Resistor
OXIDE-MT	Oxide Metal Film Resistor
Capacitors	
MT-POLYEST	Metallized Polyester Capacitor
MT-COMPO	Metallized Composite Capacitor
TA-SOLID	Tantalum Solid Capacitor
AL-SOLID	Aluminum Solid Capacitor
NP-ELECT	Non-Polarized Electrolytic Capacitor
OS-SOLID	Aluminum Solid Capacitors with Organic Semiconductive Electrolytic Capacitor
DL-ELECT	Double Layered Electrolytic Capacitor

*Tolerance of Capacitor(10pF over) and Resistor are noted with follow symboles.

F ············ ±1% G ············ ±2% J ············ ±5% K ············ ±10%

M ············ ±20% N ············ ±30% Z ············ +80% ~ −20%

*N.S.P. : Not available as service parts.

COMPL,CP-A

LOCATION	PARTS NO.	DESCRIPTION
COMPL.NO.	613 110 2064	(VR 3721 VPS)
COMPL.NO.	613 112 1843	(VR 3701 VPS)
COMPL.NO.	613 110 2071	(VR 3721)
COMPL.NO.	613 110 2088	(VR 3701)
COMPL.NO.	613 110 2095	(VR 3721 LX)
COMPL.NO.	613 112 1850	(VR 3701 LX)

VIDEO CIRCUIT(VD-A)

LOCATION	PARTS NO.	DESCRIPTION			
B1001	405 000 6104	TR DTC144ES-DCTP			
OR	405 018 2501	TR 2SC3399-AC			
B1201	405 000 6104	TR DTC144ES-DCTP			
OR	405 018 2501	TR 2SC3399-AC			
B1651	405 000 6104	TR DTC144ES-DCTP			
OR	405 018 2501	TR 2SC3399-AC			
C1001	403 025 7007	CERAMIC	4.7P	D	50V
C1002	403 073 2702	CERAMIC	390P	J	50V
C1003	403 026 2209	CERAMIC	47P	J	50V
C1004	403 179 4501	NP-ELECT	0.47U	M	50V
C1005	403 150 1703	CERAMIC	91P	J	50V
C1006	403 071 1509	CERAMIC	180P	J	50V
C1007	403 075 4001	CERAMIC	820P	J	50V
C1008	403 134 4706	NP-ELECT	2.2U	M	50V
C1009	403 001 1906	CERAMIC	0.01U	M	16V
C1010	403 121 3408	ELECT	2.2U	M	50V
C1011	403 130 2904	ELECT	0.47U	M	50V
C1012	403 075 3103	CERAMIC	82P	J	50V
C1013	403 068 8801	CERAMIC	100P	J	50V
C1014	403 063 2200	POLYESTER	0.068U	K	50V
C1015	403 001 1906	CERAMIC	0.01U	M	16V
C1016	403 001 1906	CERAMIC	0.01U	M	16V
C1017	403 001 1906	CERAMIC	0.01U	M	16V
C1018	403 135 4002	ELECT	47U	M	6.3V
C1019	403 121 3408	ELECT	2.2U	M	50V
C1020	403 107 9905	ELECT	10U	M	16V
C1021	403 121 3408	ELECT	2.2U	M	50V
C1023	403 001 1906	CERAMIC	0.01U	M	16V
C1024	403 121 2104	ELECT	22U	M	10V
C1025	403 130 2904	ELECT	0.47U	M	50V
C1031	403 001 1906	CERAMIC	0.01U	M	16V
C1032	403 135 5009	ELECT	47U	M	10V
C1033	403 001 1906	CERAMIC	0.01U	M	16V
C1034	403 001 1906	CERAMIC	0.01U	M	16V
C1035	403 135 5009	ELECT	47U	M	10V
C1036	403 139 2707	ELECT	1U	M	50V
C1037	403 026 2209	CERAMIC	47P	J	50V
C1038	403 025 7007	CERAMIC	4.7P	D	50V
C1039	403 026 2209	CERAMIC	47P	J	50V
C1040	403 139 2202	ELECT	4.7U	M	25V
C1041	403 001 1906	CERAMIC	0.01U	M	16V
C1042	403 001 1906	CERAMIC	0.01U	M	16V
C1043	403 073 6205	CERAMIC	470P	J	50V
C1051	403 071 1509	CERAMIC	180P	J	50V
C1059	403 028 3402	CERAMIC	56P	J	50V
C1063	403 074 8703	CERAMIC	680P	J	50V
C1065	403 017 9705	CERAMIC	22P	J	50V
C1081	403 002 4203	CERAMIC	0.1U	M	25V
C1101	403 003 2505	CERAMIC	0.022U	J	25V
C1102	403 001 1906	CERAMIC	0.01U	M	16V
C1103	403 109 6308	ELECT	1U	M	50V
C1104	403 001 1906	CERAMIC	0.01U	M	16V
C1105	403 109 6308	ELECT	1U	M	50V
C1106	403 109 6308	ELECT	1U	M	50V
C1107	403 003 2505	CERAMIC	0.022U	J	25V
C1108	403 104 8505	CERAMIC	0.047U	J	25V
C1109	403 001 1906	CERAMIC	0.01U	M	16V
C1112	403 109 6308	ELECT	1U	M	50V
C1113	403 104 8505	CERAMIC	0.047U	J	25V
C1114	403 025 8608	CERAMIC	43P	J	50V
C1115	403 150 1703	CERAMIC	91P	J	50V
C1116	403 001 1906	CERAMIC	0.01U	M	16V
C1117	403 135 4002	ELECT	47U	M	6.3V
C1118	403 068 8801	CERAMIC	100P	J	50V
C1119	403 001 1906	CERAMIC	0.01U	M	16V
C1121	403 001 1906	CERAMIC	0.01U	M	16V
C1124	403 073 8407	CERAMIC	4700P	K	50V
C1125	403 070 3702	CERAMIC	120P	J	50V
C1126	403 001 1906	CERAMIC	0.01U	M	16V
C1201	403 072 7500	CERAMIC	330P	J	50V
C1281	403 073 6205	CERAMIC	470P	J	50V
C1401	403 139 2202	ELECT	4.7U	M	25V
C1501	403 001 1906	CERAMIC	0.01U	M	16V
C1502	403 001 1906	CERAMIC	0.01U	M	16V
C1503	403 026 2209	CERAMIC	47P	J	50V
C1504	403 068 8801	CERAMIC	100P	J	50V
C1505	403 001 1906	CERAMIC	0.01U	M	16V
C1601	403 135 4002	ELECT	47U	M	6.3V
C1602	403 135 4002	ELECT	47U	M	6.3V
C1605	403 135 4101	ELECT	470U	M	6.3V
C1608	403 121 2104	ELECT	22U	M	10V
C1609	403 093 9606	OS-SOLID	1U	M	16V
C1631	403 022 7703	CERAMIC	33P	J	50V
C1632	403 024 1501	CERAMIC	39P	J	50V
C1681	403 068 9402	CERAMIC	100P	K	50V
C1682	403 012 6006	CERAMIC	15P	J	50V
CN165	613 009 1635	SOCKET,21P			

LOCATION	PARTS NO.	DESCRIPTION
D1001	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D1002	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D1003	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D1004	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D1031	407 070 8408	ZENER DIODE GZS9.1Y-TB
OR	407 053 8906	ZENER DIODE MTZ9.1C-T-77
D1501	407 077 3109	DIODE SB0015-03A-BT
D1502	407 077 3109	DIODE SB0015-03A-BT
D1601	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D1602	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D1604	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D1651	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D1652	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
DL131	613 110 0367	DELAY,2H
OR	613 110 1708	DELAY,2H
IC101	409 178 3309	IC LA7340
IC102	409 148 4800	IC TL8709P
IC111	409 208 7208	IC LA7332
IC161	409 120 3401	IC LA7221
L1001	613 014 0951	COIL,INDUCTOR 68UHK
L1031	613 014 0968	COIL,INDUCTOR 82UHK
L1033	613 014 0739	COIL,INDUCTOR 1.0UHM
L1057	613 014 0975	COIL,INDUCTOR 100UHK
L1058	613 014 0951	COIL,INDUCTOR 68UHK
L1101	613 014 0883	COIL,INDUCTOR 18UHK
L1102	613 014 0791	COIL,INDUCTOR 3.3UHK
L1103	613 014 0876	COIL,INDUCTOR 15UHK
L1104	613 015 6327	HF CHOKE 1MH J
L1105	613 014 0937	COIL,INDUCTOR 47UHK
L1501	613 015 6174	HF CHOKE 56UH J
L1502	613 015 6167	HF CHOKE 47UH J
L1631	613 014 0975	COIL,INDUCTOR 100UHK
L1681	613 014 0777	COIL,INDUCTOR 2.2UHM
Q1001	405 093 0508	TR KSA1175-Y
OR	405 004 4007	TR 2SA608-E-SPA-AC
OR	405 004 4601	TR 2SA608-F-SPA-AC
OR	405 006 1707	TR 2SA933S-TP-Q
OR	405 006 1806	TR 2SA933S-T93-R
Q1002	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1003	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1031	405 093 0508	TR KSA1175-Y
OR	405 004 4007	TR 2SA608-E-SPA-AC
OR	405 004 4601	TR 2SA608-F-SPA-AC
OR	405 006 1707	TR 2SA933S-TP-Q
OR	405 006 1806	TR 2SA933S-T93-R
Q1052	405 016 0905	TR 2SC2839-E-SPA-AC
OR	405 016 1100	TR 2SC2839-F-SPA-AC
OR	405 015 2603	TR 2SC2669-Y-TPE4

LOCATION	PARTS NO.	DESCRIPTION
Q1052	405 015 2504	TR 2SC2669-O-TPE4
OR	405 012 9506	TR 2SC2058S-DCTP-Q
Q1054	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 093 0607	TR KSC2785-Y
Q1101	405 093 0508	TR KSA1175-Y
OR	405 004 4007	TR 2SA608-E-SPA-AC
OR	405 004 4601	TR 2SA608-F-SPA-AC
OR	405 006 1707	TR 2SA933S-TP-Q
OR	405 006 1806	TR 2SA933S-T93-R
Q1102	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1103	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1104	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1105	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1106	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1151	405 004 4007	TR 2SA608-E-SPA-AC
OR	405 004 4601	TR 2SA608-F-SPA-AC
OR	405 006 1707	TR 2SA933S-TP-Q
OR	405 006 1806	TR 2SA933S-T93-R
OR	405 093 0508	TR KSA1175-Y
Q1401	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1402	405 006 6504	TR 2SA984-E-AA
OR	405 006 6702	TR 2SA984-F-AA
Q1403	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1404	405 089 0109	TR 2SA1707-T-AN
OR	405 084 7905	TR 2SB1240-TV2-R
Q1501	405 012 9506	TR 2SC2058S-DCTP-Q
OR	405 015 2504	TR 2SC2669-O-TPE4
OR	405 015 2603	TR 2SC2669-Y-TPE4
OR	405 016 0905	TR 2SC2839-E-SPA-AC
OR	405 016 1100	TR 2SC2839-F-SPA-AC
Q1502	405 012 9506	TR 2SC2058S-DCTP-Q
OR	405 015 2504	TR 2SC2669-O-TPE4
OR	405 015 2603	TR 2SC2669-Y-TPE4
OR	405 016 0905	TR 2SC2839-E-SPA-AC
OR	405 016 1100	TR 2SC2839-F-SPA-AC
Q1601	405 004 4601	TR 2SA608-F-SPA-AC
OR	405 006 1806	TR 2SA933S-T93-R
Q1602	405 093 0508	TR KSA1175-Y

LOCATION	PARTS NO.	DESCRIPTION
Q1602	405 004 4007	TR 2SA608-E-SPA-AC
OR	405 004 4601	TR 2SA608-F-SPA-AC
OR	405 006 1707	TR 2SA933S-TP-Q
OR	405 006 1806	TR 2SA933S-T93-R
Q1631	405 093 0607	TR KSC2785-Y
OR	405 011 8401	TR 2SC1740S-DCTP-Q
OR	405 011 8500	TR 2SC1740S-DCTP-R
OR	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
Q1651	405 093 0508	TR KSA1175-Y
OR	405 004 4007	TR 2SA608-E-SPA-AC
OR	405 004 4601	TR 2SA608-F-SPA-AC
OR	405 006 1707	TR 2SA933S-TP-Q
OR	405 006 1806	TR 2SA933S-T93-R
R1001	401 012 5609	CARBON 1K JA 1/4W
R1002	401 017 1705	CARBON 2.7K JA 1/4W
R1003	401 022 1806	CARBON 680 JA 1/4W
R1004	401 012 9201	CARBON 1M JA 1/4W
R1005	401 012 5609	CARBON 1K JA 1/4W
R1006	401 017 1705	CARBON 2.7K JA 1/4W
R1007	401 012 5609	CARBON 1K JA 1/4W
R1008	401 022 1806	CARBON 680 JA 1/4W
R1009	401 012 5609	CARBON 1K JA 1/4W
R1010	401 017 8506	CARBON 300 JA 1/4W
R1011	401 015 2605	CARBON 1.8K JA 1/4W
R1012	401 015 4609	CARBON 180K JA 1/4W
R1013	401 012 9201	CARBON 1M JA 1/4W
R1014	401 016 3700	CARBON 2.2K JA 1/4W
R1015	401 023 2703	CARBON 8.2K JA 1/4W
R1016	401 013 5202	CARBON 1.2K JA 1/4W
R1018	401 012 5609	CARBON 1K JA 1/4W
R1019	401 016 2505	CARBON 220 JA 1/4W
R1020	401 020 3802	CARBON 470K JA 1/4W
R1021	401 014 6000	CARBON 150K JA 1/4W
R1022	401 022 1806	CARBON 680 JA 1/4W
R1023	401 016 4707	CARBON 22K JA 1/4W
R1024	401 020 2805	CARBON 47K JA 1/4W
R1025	401 016 3700	CARBON 2.2K JA 1/4W
R1031	401 019 9501	CARBON 47 JA 1/4W
R1032	401 019 9501	CARBON 47 JA 1/4W
R1033	401 021 0602	CARBON 56 JA 1/4W
R1034	401 020 7800	CARBON 510 JA 1/4W
R1035	401 021 8103	CARBON 620 JA 1/4W
R1051	401 016 4707	CARBON 22K JA 1/4W
R1052	401 016 4707	CARBON 22K JA 1/4W
R1056	401 019 0904	CARBON 390 JA 1/4W
R1057	401 015 2605	CARBON 1.8K JA 1/4W
R1068	401 021 1807	CARBON 560 JA 1/4W
R1071	401 019 0904	CARBON 390 JA 1/4W
R1072	401 019 0904	CARBON 390 JA 1/4W
R1101	401 020 2805	CARBON 47K JA 1/4W
R1102	401 016 4707	CARBON 22K JA 1/4W
R1103	401 012 5609	CARBON 1K JA 1/4W
R1104	401 013 5202	CARBON 1.2K JA 1/4W
R1105	401 018 2701	CARBON 330 JA 1/4W
R1106	401 021 1807	CARBON 560 JA 1/4W
R1107	401 012 5609	CARBON 1K JA 1/4W
R1108	401 012 5609	CARBON 1K JA 1/4W
R1109	401 012 6903	CARBON 10K JA 1/4W
R1110	401 023 2703	CARBON 8.2K JA 1/4W
R1111	401 012 5609	CARBON 1K JA 1/4W
R1112	401 015 2605	CARBON 1.8K JA 1/4W
R1113	401 012 8006	CARBON 100K JA 1/4W
R1114	401 019 0904	CARBON 390 JA 1/4W
R1115	401 012 5609	CARBON 1K JA 1/4W
R1116	401 019 1802	CARBON 3.9K JA 1/4W
R1117	401 014 4006	CARBON 1.5K JA 1/4W
R1118	401 022 7105	CARBON 750 JA 1/4W
R1119	401 012 5609	CARBON 1K JA 1/4W
R1120	401 012 4404	CARBON 100 JA 1/4W
R1121	401 012 5609	CARBON 1K JA 1/4W
R1122	401 020 0702	CARBON 470 JA 1/4W
R1123	401 014 4006	CARBON 1.5K JA 1/4W
R1124	401 015 8805	CARBON 200 JA 1/4W
R1125	401 023 1607	CARBON 820 JA 1/4W
R1126	401 012 5609	CARBON 1K JA 1/4W
R1127	401 014 8202	CARBON 160 JA 1/4W
R1128	401 012 5609	CARBON 1K JA 1/4W
R1129	401 018 2701	CARBON 330 JA 1/4W
R1152	401 012 5609	CARBON 1K JA 1/4W
R1401	401 016 4707	CARBON 22K JA 1/4W
R1402	401 016 4707	CARBON 22K JA 1/4W
R1403	401 023 2703	CARBON 8.2K JA 1/4W
R1404	401 020 1907	CARBON 4.7K JA 1/4W
R1405	401 020 2805	CARBON 47K JA 1/4W
R1406	401 020 2805	CARBON 47K JA 1/4W
R1407	401 015 2605	CARBON 1.8K JA 1/4W
R1408	401 016 2505	CARBON 220 JA 1/4W
R1501	401 018 3708	CARBON 3.3K JA 1/4W
R1502	401 017 2702	CARBON 27K JA 1/4W
R1503	401 020 0702	CARBON 470 JA 1/4W
R1504	401 019 0904	CARBON 390 JA 1/4W
R1505	401 015 9406	CARBON 2K JA 1/4W
R1506	401 017 2702	CARBON 27K JA 1/4W
R1507	401 020 0702	CARBON 470 JA 1/4W
R1508	401 012 4404	CARBON 100 JA 1/4W
R1602	401 022 6702	CARBON 75 JA 1/4W
R1603	401 012 5609	CARBON 1K JA 1/4W
R1606	401 012 5609	CARBON 1K JA 1/4W
R1607	401 021 1807	CARBON 560 JA 1/4W
R1608	401 022 6702	CARBON 75 JA 1/4W
R1609	401 013 9408	CARBON 1.3K JA 1/4W
R1610	401 021 1807	CARBON 560 JA 1/4W
R1631	401 021 2903	CARBON 5.6K JA 1/4W
R1632	401 012 5609	CARBON 1K JA 1/4W
R1633	401 023 1607	CARBON 820 JA 1/4W
R1634	401 015 2605	CARBON 1.8K JA 1/4W
R1641	401 015 2605	CARBON 1.8K JA 1/4W
R1651	401 012 6903	CARBON 10K JA 1/4W
R1652	401 012 5609	CARBON 1K JA 1/4W
R1653	401 021 2903	CARBON 5.6K JA 1/4W
R1654	401 021 2903	CARBON 5.6K JA 1/4W
R1655	401 016 4707	CARBON 22K JA 1/4W
R1656	401 021 0602	CARBON 56 JA 1/4W
R1661	401 020 1907	CARBON 4.7K JA 1/4W
VR101	613 001 8977	SEMI VR 1KB
OR	613 001 9370	SEMI VR 1KB
VR102	613 001 9035	SEMI VR 10KB
OR	613 001 9417	SEMI VR 10KB
VR103	613 001 9059	SEMI VR 22KB
OR	613 001 9424	SEMI VR 20KB
VR104	613 001 9035	SEMI VR 10KB
OR	613 001 9417	SEMI VR 10KB
VR105	613 001 8977	SEMI VR 1KB
OR	613 001 9370	SEMI VR 1KB
VR361	613 094 6034	VR,ROTARY 100KB
X1101	613 080 9407	OSC,CRYSTAL 4.43MHZ
OR	613 093 8008	OSC,CRYSTAL 4.433619MHZ
XF101	613 004 5539	LC PACK 4MHZ LPF
XF111	613 004 5485	LC PACK

AUDIO CIRCUIT(AD-A)

B2101	405 018 2501	TR 2SC3399-AC

LOCATION	PARTS NO.	DESCRIPTION
B2101	405 000 6104	TR DTC144ES-DCTP
C2001	403 049 1401	ELECT 1U M 50V
C2002	403 075 4506	CERAMIC 820P K 50V
C2004	403 135 3708	ELECT 33U M 6.3V
C2005	403 003 0600	CERAMIC 0.018U K 25V
C2006	403 130 2904	ELECT 0.47U M 50V
C2008	403 001 6505	CERAMIC 3300P K 16V
C2009	403 135 4002	ELECT 47U M 6.3V
C2010	403 107 9905	ELECT 10U M 16V
C2013	403 003 2406	CERAMIC 0.022U J 25V
C2016	403 109 6308	ELECT 1U M 50V
C2017	403 134 5901	ELECT 33U M 16V
C2018	403 121 3002	ELECT 4.7U M 25V
C2019	403 134 9602	ELECT 47U M 16V
C2020	403 071 6207	CERAMIC 220P K 50V
C2021	403 081 7409	POLYPRO 0.033U J 100V
C2022	403 002 1905	CERAMIC 0.01U K 25V
C2024	403 002 1905	CERAMIC 0.01U K 25V
C2025	403 003 3700	CERAMIC 0.022U Z 25V
C2051	403 069 1207	CERAMIC 1000P K 50V
		(VR 3721 VPS,3701 VPS)
C2151	403 069 1207	CERAMIC 1000P K 50V
C2152	403 069 1207	CERAMIC 1000P K 50V
D2101	407 012 4406	DIODE 1SS133-T-77
OR	407 007 9904	DIODE GMA01-BT
D2102	407 012 4406	DIODE 1SS133-T-77
OR	407 007 9904	DIODE GMA01-BT
IC201	409 133 1401	IC LA7294
L2002	613 014 3037	HF CHOKE 10MH J
L2003	613 014 2870	HF CHOKE
L2151	613 014 0739	HF CHOKE 1.0UHM
		(VR 3721 VPS,3701 VPS)
OR	613 014 4256	HF CHOKE 1.0UH K
		(VR 3721 VPS,3701 VPS)
Q2001	405 024 9709	TR 2SD734-E-AA
OR	405 024 9907	TR 2SD734-F-AA
Q2101	405 033 6706	TR 2SD1468S-DCTP-R
OR	405 033 6805	TR 2SD1468S-DCTP-S
Q2102	405 033 6706	TR 2SD1468S-DCTP-R
OR	405 033 6805	TR 2SD1468S-DCTP-S
R2001	401 012 4404	CARBON 100 JA 1/4W
R2002	401 022 3008	CARBON 6.8K JA 1/4W
R2003	401 023 0600	CARBON 82 JA 1/4W
R2004	401 019 3905	CARBON 390K JA 1/4W
R2005	401 021 8905	CARBON 6.2K JA 1/4W
R2006	401 017 1705	CARBON 2.7K JA 1/4W
R2009	401 018 6501	CARBON 3.3M JA 1/4W
R2010	401 012 6903	CARBON 10K JA 1/4W
R2011	401 016 0006	CARBON 20K JA 1/4W
R2012	401 022 7600	CARBON 7.5K JA 1/4W
R2013	401 012 5609	CARBON 1K JA 1/4W
R2014	401 015 2605	CARBON 1.8K JA 1/4W
R2016	401 012 6903	CARBON 10K JA 1/4W
R2017	401 012 6903	CARBON 10K JA 1/4W
R2018	401 015 3701	CARBON 18K JA 1/4W
R2019	401 015 3701	CARBON 18K JA 1/4W
R2021	401 012 3308	CARBON 10 JA 1/4W
R2022	401 019 9501	CARBON 47 JA 1/4W
R2023	401 014 5102	CARBON 15K JA 1/4W
R2024	401 019 6104	CARBON 4.7 JA 1/4W
R2051	401 012 5609	CARBON 1K JA 1/4W
		(VR 3721 VPS,3701 VPS)
R2101	401 020 2805	CARBON 47K JA 1/4W
R2102	401 019 2908	CARBON 39K JA 1/4W
R2103	401 020 2805	CARBON 47K JA 1/4W
R2104	401 019 8207	CARBON 43K JA 1/4W
		(EXCEPT VR 3721 LX,3701 LX)
OR	401 015 3701	CARBON 18K JA 1/4W
		(VR 3721 LX,3701 LX)
R2105	401 012 5609	CARBON 1K JA 1/4W
R2106	401 014 8509	CARBON 1.6K JA 1/4W
R2107	401 017 1705	CARBON 2.7K JA 1/4W
R2108	401 017 1705	CARBON 2.7K JA 1/4W
R2109	401 012 5609	CARBON 1K JA 1/4W
R2110	401 023 1607	CARBON 820 JA 1/4W
R2111	401 012 6903	CARBON 10K JA 1/4W
R2112	401 012 6903	CARBON 10K JA 1/4W
R2113	401 012 6903	CARBON 10K JA 1/4W
R2114	401 016 3700	CARBON 2.2K JA 1/4W
R2115	401 016 3700	CARBON 2.2K JA 1/4W
T2001	613 016 2205	OSC COIL 70KHZ
OR	613 094 3378	TRANS,OSC 70KHZ
VR201	613 001 9097	SEMI VR 100KB
OR	613 097 7915	VR,SEMI 100KB
VR202	613 001 9035	SEMI VR 10KB
OR	613 097 7908	VR,SEMI 10KB

SYSTEM CONTROL CIRCUIT(SY-A)

LOCATION	PARTS NO.	DESCRIPTION
B3001	405 000 3103	TR DTC114ES-DCTP
OR	405 018 2808	TR 2SC3402-AC
B3002	405 000 3103	TR DTC114ES-DCTP
OR	405 018 2808	TR 2SC3402-AC
C3001	403 002 2506	CERAMIC 0.01U M 25V
C3002	403 002 4807	CERAMIC 0.1U Z 25V
C3003	403 121 3408	ELECT 2.2U M 50V
C3004	403 135 3708	ELECT 33U M 6.3V
C3005	403 001 3108	CERAMIC 0.1U Z 16V
C3006	403 001 3108	CERAMIC 0.1U Z 16V
C3007	403 001 3108	CERAMIC 0.1U Z 16V
C3008	403 134 8100	ELECT 100U M 6.3V
C3009	403 001 3108	CERAMIC 0.1U Z 16V
C3011	403 001 8806	CERAMIC 6800P K 16V
C3012	403 155 2804	DL-ELECT 0.047F Z 5.5V
D3001	407 051 6904	ZENER DIODE GZS5.6Y-BT
OR	407 099 5303	ZENER DIODE MTZJ5.6B-T-77
D3002	407 070 8101	ZENER DIODE GZS8.2Y-BT
OR	407 063 9504	ZENER DIODE MTZJ8.2B-T-77
D3003	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
IC301	410 094 5902	IC LC66308A-4410
IC302	409 114 4803	IC LB1641
IC303	409 167 9800	IC BA10393
OR	409 018 3902	IC LA6393D
OR	409 057 3406	IC UPC393C
IC304	409 032 3704	IC MN1280-R
OR	409 032 3803	IC MN1280-S
R3001	402 036 4401	FUSIBLE RES 3.3 JA 1/2W
OR	402 036 3701	FUSIBLE RES 3.3 JA 1/2W
R3002	401 022 7105	CARBON 750 JA 1/4W
R3003	401 012 6903	CARBON 10K JA 1/4W
R3004	401 012 6903	CARBON 10K JA 1/4W
R3005	401 022 7105	CARBON 750 JA 1/4W
R3006	401 020 1907	CARBON 4.7K JA 1/4W
R3007	401 020 1907	CARBON 4.7K JA 1/4W
R3008	401 020 1907	CARBON 4.7K JA 1/4W

LOCATION	PARTS NO.	DESCRIPTION
R3009	401 020 1907	CARBON 4.7K JA 1/4W
R3010	401 020 1907	CARBON 4.7K JA 1/4W
R3011	401 012 5609	CARBON 1K JA 1/4W
R3012	401 012 5609	CARBON 1K JA 1/4W
R3013	401 012 5609	CARBON 1K JA 1/4W
R3014	401 012 5609	CARBON 1K JA 1/4W
R3015	401 012 5609	CARBON 1K JA 1/4W
R3016	401 012 5609	CARBON 1K JA 1/4W
R3017	401 014 4006	CARBON 1.5K JA 1/4W
R3018	401 022 3008	CARBON 6.8K JA 1/4W
R3019	401 013 7206	CARBON 120K JA 1/4W
R3020	401 017 9701	CARBON 30K JA 1/4W
R3021	401 017 9701	CARBON 30K JA 1/4W
R3022	401 012 6903	CARBON 10K JA 1/4W
R3023	401 016 0006	CARBON 20K JA 1/4W
R3024	401 021 4006	CARBON 56K JA 1/4W
R3025	401 014 6000	CARBON 150K JA 1/4W
R3026	401 016 4707	CARBON 22K JA 1/4W
R3027	401 018 4804	CARBON 33K JA 1/4W
R3028	401 017 2702	CARBON 27K JA 1/4W
R3029	401 023 4509	CARBON 820K JA 1/4W
R3030	401 017 3709	CARBON 270K JA 1/4W
R3031	401 016 3700	CARBON 2.2K JA 1/4W
R3032	401 020 1907	CARBON 4.7K JA 1/4W
R3033	401 020 1907	CARBON 4.7K JA 1/4W
R3034	401 020 1907	CARBON 4.7K JA 1/4W
R3035	401 020 1907	CARBON 4.7K JA 1/4W
R3036	401 019 1802	CARBON 3.9K JA 1/4W
R3037	401 012 8006	CARBON 100K JA 1/4W
R3038	401 012 8006	CARBON 100K JA 1/4W
R3039	401 012 8006	CARBON 100K JA 1/4W
R3040	401 023 4509	CARBON 820K JA 1/4W
R3041	401 012 5609	CARBON 1K JA 1/4W
R3042	401 012 5609	CARBON 1K JA 1/4W
R3046	401 012 6903	CARBON 10K JA 1/4W
R3047	401 014 4006	CARBON 1.5K JA 1/4W
R3048	401 012 6903	CARBON 10K JA 1/4W
R3101	401 012 6903	CARBON 10K JA 1/4W
XF301	613 079 7414	CERAMIC RESONATOR 4.0MHZ
OR	613 108 2496	RESONATOR,CERAMIC 4.0MHZ

SERVO CIRCUIT(SV-A)

LOCATION	PARTS NO.	DESCRIPTION
B3501	405 000 6104	TR DTC144ES-DCTP
OR	405 018 2501	TR 2SC3399-AC
B3502	405 000 6104	TR DTC144ES-DCTP
OR	405 018 2501	TR 2SC3399-AC
B3503	405 000 6104	TR DTC144ES-DCTP
OR	405 018 2501	TR 2SC3399-AC
C3502	403 001 3108	CERAMIC 0.1U Z 16V
C3503	403 059 6502	POLYESTER 0.022U K 50V
C3504	403 057 8009	POLYESTER 0.01U K 50V
C3506	403 057 6801	POLYESTER 0.012U J 50V
C3507	403 063 7700	POLYESTER 0.082U K 50V
C3508	403 002 8508	CERAMIC 0.015U K 25V
C3509	403 001 8806	CERAMIC 6800P K 16V
C3510	403 042 8803	ELECT 22U M 16V
C3511	403 042 8803	ELECT 22U M 16V
C3512	403 002 8508	CERAMIC 0.015U K 25V
C3513	403 063 0008	POLYESTER 6800P K 50V
C3514	403 168 6103	MT-POLYEST 0.1U J 50V
OR	403 067 5603	MT-COMPO 0.1U J 50V
C3515	403 001 8806	CERAMIC 6800P K 16V
C3516	403 042 8803	ELECT 22U M 16V
C3517	403 042 8803	ELECT 22U M 16V
C3518	403 115 1601	CERAMIC 5600P K 16V
C3519	403 115 1601	CERAMIC 5600P K 16V
C3520	403 175 1009	MT-POLYEST 0.15U J 50V
OR	403 067 6204	MT-COMPO 0.15U J 50V
C3521	403 135 4002	ELECT 47U M 6.3V
C3522	403 001 1609	CERAMIC 0.01U K 16V
C3523	403 109 6308	ELECT 1U M 50V
C3524	403 068 9402	CERAMIC 100P K 50V
C3525	403 134 4706	NP-ELECT 2.2U M 50V
C3526	403 108 0000	ELECT 0.22U M 50V
C3527	403 109 6308	ELECT 1U M 50V
C3528	403 069 1207	CERAMIC 1000P K 50V
C3529	403 001 1609	CERAMIC 0.01U K 16V
C3530	403 004 4607	CERAMIC 0.068U K 25V
C3533	403 069 1207	CERAMIC 1000P K 50V
C3534	403 069 1207	CERAMIC 1000P K 50V
C3535	403 135 3708	ELECT 33U M 6.3V
C3536	403 001 5003	CERAMIC 2200P K 16V
C3537	403 135 7805	ELECT 3.3U M 50V
C3538	403 107 9905	ELECT 10U M 16V
C3539	403 070 4105	CERAMIC 120P K 50V
C3540	403 120 7506	CERAMIC 220P K 50V
D3501	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D3502	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D3503	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D3504	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D3505	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D3506	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D3507	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
IC351	409 180 3700	IC LC7416-8080
IC352	409 178 3507	IC LA7123
R3501	401 013 6308	CARBON 12K JA 1/4W
R3502	401 018 4804	CARBON 33K JA 1/4W
R3503	401 012 6903	CARBON 10K JA 1/4W
R3504	401 012 6903	CARBON 10K JA 1/4W
R3505	401 014 4006	CARBON 1.5K JA 1/4W
R3506	401 023 7401	CARBON 9.1K JA 1/4W
R3507	401 016 4707	CARBON 22K JA 1/4W
R3508	401 016 4707	CARBON 22K JA 1/4W
R3509	401 012 8006	CARBON 100K JA 1/4W
R3510	401 012 8006	CARBON 100K JA 1/4W
R3511	401 014 5102	CARBON 15K JA 1/4W
R3512	401 014 6000	CARBON 150K JA 1/4W
R3513	401 018 5702	CARBON 330K JA 1/4W
R3514	401 018 5702	CARBON 330K JA 1/4W
R3515	401 018 4804	CARBON 33K JA 1/4W
R3516	401 017 3709	CARBON 270K JA 1/4W
R3517	401 014 6000	CARBON 150K JA 1/4W
R3518	401 012 6903	CARBON 10K JA 1/4W
R3519	401 014 6000	CARBON 150K JA 1/4W
R3520	401 017 2702	CARBON 27K JA 1/4W
R3521	401 018 4804	CARBON 33K JA 1/4W
R3522	401 012 9201	CARBON 1M JA 1/4W
R3525	401 012 6903	CARBON 10K JA 1/4W
R3526	401 016 5704	CARBON 220K JA 1/4W
R3527	401 016 3700	CARBON 2.2K JA 1/4W
R3528	401 016 3700	CARBON 2.2K JA 1/4W
R3529	401 016 3700	CARBON 2.2K JA 1/4W
R3530	401 018 7508	CARBON 360 JA 1/4W
R3531	401 016 5704	CARBON 220K JA 1/4W
R3532	401 020 9200	CARBON 510K JA 1/4W

LOCATION	PARTS NO.	DESCRIPTION
R3533	401 020 7800	CARBON 510 JA 1/4W
R3534	401 020 7800	CARBON 510 JA 1/4W
R3537	401 018 5702	CARBON 330K JA 1/4W
VR351	613 001 9110	SEMI VR 220KB

POWER SUPPLY CIRCUIT(PW-A)

LOCATION	PARTS NO.	DESCRIPTION
C5402	403 135 4002	ELECT 47U M 6.3V
D5403	407 053 3109	ZENER DIODE MTZ12A-T-77
D5404	407 078 2705	DIODE 1SS244-T-77
D5405	407 078 1104	ZENER DIODE MTZ33A-T-77
D5406	407 053 2706	ZENER DIODE MTZ10C-T-77
Q5401	405 088 9103	TR 2SA1703-S-AN
Q5402	405 089 2103	TR 2SC4483-S-AN
Q5403	405 006 7006	TR 2SA984K-E-AA
OR	405 006 7204	TR 2SA984K-F-AA
Q5404	405 006 7006	TR 2SA984K-E-AA
OR	405 006 7204	TR 2SA984K-F-AA
R5401	401 021 8905	CARBON 6.2K JA 1/4W
R5402	401 016 3700	CARBON 2.2K JA 1/4W
R5403	401 012 5609	CARBON 1K JA 1/4W
R5404 ⚠	402 041 6209	FUSIBLE RES 820 JA 1/4W
R5405	401 018 3708	CARBON 3.3K JA 1/4W
R5406	401 014 5102	CARBON 15K JA 1/4W
R5407	401 019 7705	CARBON 4.3K JA 1/4W
R5408 ⚠	402 004 1906	FUSIBLE RES 47 JA 1/4W
R5409	401 013 6308	CARBON 12K JA 1/4W
R5410	401 014 2804	CARBON 150 JA 1/4W
R5411	401 014 2804	CARBON 150 JA 1/4W

TUNER CIRCUIT(TN-A)

LOCATION	PARTS NO.	DESCRIPTION
B6001	405 018 2501	TR 2SC3399-AC
OR	405 000 6104	TR DTC144ES-DCTP
B6002	405 003 7603	TR 2SA1345-AC
OR	405 000 2205	TR DTA144ES-DCTP
OR	405 063 9104	TR DTA144EL-TL2
B6003	405 018 2501	TR 2SC3399-AC
OR	405 000 6104	TR DTC144ES-DCTP
C6001	403 002 4708	CERAMIC 0.1U Z 25V
C6002	403 121 3002	ELECT 4.7U M 25V
C6003	403 109 6308	ELECT 1U M 50V
C6004	403 067 5603	MT-COMPO 0.1U J 50V
OR	403 065 8002	MT-POLYEST 0.1U J 63V
OR	403 168 6103	MT-POLYEST 0.1U J 50V
C6005	403 121 3002	ELECT 4.7U M 25V
C6006	403 125 5606	ELECT 100U M 16V
C6007	403 143 2809	CERAMIC 0.047U Z 50V
C6008	403 109 6308	ELECT 1U M 50V
C6009	403 135 7409	ELECT 22U M 50V
C6010	403 121 9509	CERAMIC 0.1U Z 50V
IC601	409 026 8203	IC L5631
OR	409 057 5103	IC UPC574J
IC602	409 148 5005	IC M6M80021P
OR	409 199 5306	IC M6M80011AP
Q6001	405 027 8709	TR 2SK68A-K
OR	405 057 9301	TR 2SK68A-L1
OR	405 040 0605	TR 2SK222-C
OR	405 026 9004	TR 2SK222-D
Q6002	405 004 4007	TR 2SA608-E-SPA-AC
OR	405 004 4601	TR 2SA608-F-SPA-AC
OR	405 006 1707	TR 2SA933S-TP-Q
Q6002	405 006 1806	TR 2SA933S-T93-R
OR	405 093 0508	TR KSA1175-Y
Q6003	405 019 2005	TR 2SC536-E-SPA-AC
OR	405 019 2807	TR 2SC536-F-SPA-AC
OR	405 093 0607	TR KSC2785-Y
R6001	401 018 2701	CARBON 330 JA 1/4W
R6002	401 019 0904	CARBON 390 JA 1/4W
R6003	401 012 9201	CARBON 1M JA 1/4W
R6004	401 019 3905	CARBON 390K JA 1/4W
R6005	401 020 3802	CARBON 470K JA 1/4W
R6006	401 019 3905	CARBON 390K JA 1/4W
R6007	401 016 8705	CARBON 240K JA 1/4W
R6008	401 012 5609	CARBON 1K JA 1/4W
R6009	401 012 6903	CARBON 10K JA 1/4W
R6010	401 012 6903	CARBON 10K JA 1/4W
R6014	401 015 9406	CARBON 2K JA 1/4W (VR 3721 VPS.3701 VPS)
R6015	401 012 6903	CARBON 10K JA 1/4W

RF CONVERTER CIRCUIT(CV-A)

LOCATION	PARTS NO.	DESCRIPTION
C6601	403 134 8100	ELECT 100U M 6.3V
C6602	403 134 8100	ELECT 100U M 6.3V
L6601	613 015 6631	HF CHOKE 15UH K
OR	613 014 8667	HF CHOKE 15UH K
L6602	613 015 6631	HF CHOKE 15UH K
OR	613 014 8667	HF CHOKE 15UH K

COMPL.VD-1

COMPL.NO. 613 108 4186

LOCATION	PARTS NO.	DESCRIPTION
B1701	405 029 3504	TR DTC144EK-T96
OR	405 018 1900	TR 2SC3395-TB
C1701	403 069 5601	CERAMIC 0.01U K 50V
C1702	403 009 5807	CERAMIC 100P J 50V
C1703	403 189 2405	ELECT 10U M 16V
C1704	403 068 0409	CERAMIC 0.1U Z 25V
C1705	403 189 2405	ELECT 10U M 16V
C1706	403 069 5601	CERAMIC 0.01U K 50V
D1701	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
IC171	409 003 4907	IC BA7025L
J1701	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
Q1701	405 014 4400	TR 2SC2412K-T96-Q
OR	405 014 4509	TR 2SC2412K-T96-R
OR	405 014 4608	TR 2SC2412K-T96-S
OR	405 015 8407	TR 2SC2812-L5-TB
OR	405 015 8704	TR 2SC2812-L6-TB
R1701	401 038 0800	MT-GLAZE 22K JA 1/10W
R1702	401 037 5608	MT-GLAZE 10K JA 1/10W
R1703	401 038 7700	MT-GLAZE 5.6K JA 1/10W
R1704	401 037 5400	MT-GLAZE 1K JA 1/10W
R1705	401 038 0800	MT-GLAZE 22K JA 1/10W
R1706	401 037 5400	MT-GLAZE 1K JA 1/10W
R1707	401 038 0701	MT-GLAZE 2.2K JA 1/10W
R1708	401 037 8104	MT-GLAZE 150K JA 1/10W
R1709	401 038 5805	MT-GLAZE 430 JA 1/10W
R1710	401 038 0800	MT-GLAZE 22K JA 1/10W
R1711	401 037 5608	MT-GLAZE 10K JA 1/10W
XF171	613 084 1681	FILTER 4.16MHZ B.F

LOCATION	PARTS NO.	DESCRIPTION
XF172	613 015 8604	CHOKE COIL
COMPL,VP-1		
COMPL.NO.	613 117 0735	(VR 3721 VPS,3701 VPS)
COMPL.NO.	613 117 0728	(EXCEPT VR 3721 VPS,3701 VPS)
C1801	403 069 1207	CERAMIC 1000P K 50V
C1803	403 093 8104	OS-SOLID 4.7U M 10V
C1804	403 073 6205	CERAMIC 470P J 50V
C1805	403 068 8801	CERAMIC 100P J 50V
C1806	403 001 1906	CERAMIC 0.01U M 16V
C1807	403 001 1906	CERAMIC 0.01U M 16V
C1808	403 003 3304	CERAMIC 0.022U M 25V
C1809	403 163 8409	ELECT 47U M 16V
C1810	403 001 1906	CERAMIC 0.01U M 16V
C1811	403 003 3304	CERAMIC 0.022U M 25V
C1812	403 191 8709	ELECT 1U M 50V
C1813	403 003 1805	CERAMIC 2200P M 25V
C1814	403 003 7104	CERAMIC 0.033U M 25V
C1815	403 026 2209	CERAMIC 47P J 50V
C1816	403 026 2209	CERAMIC 47P J 50V
C1817	403 003 7104	CERAMIC 0.033U M 25V
C1818	403 003 1805	CERAMIC 2200P M 25V
IC181	409 134 2001	IC LA7320
L1801	613 014 0968	COIL,INDUCTOR 82UHK
L1802	613 014 0951	COIL,INDUCTOR 68UHK
R1801	401 013 5202	CARBON 1.2K JA 1/4W
R1802	401 015 1509	CARBON 180 JA 1/4W
R1803	401 016 2505	CARBON 220 JA 1/4W
R1804	401 020 5509	CARBON 5.1 JA 1/4W
VR181	613 002 0345	SEMI VR 1KB
VR182	613 002 0345	SEMI VR 1KB
COMPL,PW-1		
COMPL.NO.	613 108 8771	(VR 3721 VPS,3701 VPS)
COMPL.NO.	613 108 4209	(EXCEPT VR 3721 VPS,3701 VPS)
	613 108 7545	HOLDER,FUSE
C5101	403 134 5307	ELECT 1000U M 25V
OR	403 148 0404	ELECT 1000U M 25V
C5102	403 110 1705	ELECT 2200U M 25V
OR	403 148 0701	ELECT 2200U M 25V
C5103	403 160 6309	ELECT 2200U M 16V
C5104	403 157 0006	ELECT 47U M 63V
C5105	403 195 5100	ELECT 47U M 100V
OR	403 155 5805	ELECT 47U M 100V
C5106	403 168 6103	MT-POLYEST 0.1U J 50V
C5107	403 135 9403	ELECT 47U M 35V
C5108	403 107 9905	ELECT 10U M 16V
C5109	403 107 9905	ELECT 10U M 16V
D5101	407 004 9600	DIODE DSF10TC-BT
D5102	407 004 9600	DIODE DSF10TC-BT
D5103	407 132 7400	DIODE GP30DL-6326
D5104	407 132 7400	DIODE GP30DL-6326
D5105	407 004 9709	DIODE DSK10C-BT
OR	407 088 6502	DIODE MPG06D-PKG3
OR	407 005 8701	DIODE ERA15-02A-V5
D5106	407 004 9709	DIODE DSK10C-BT
OR	407 088 6502	DIODE MPG06D-PKG3
OR	407 005 8701	DIODE ERA15-02A-V5
D5107	407 004 9709	DIODE DSK10C-BT
OR	407 088 6502	DIODE MPG06D-PKG3
OR	407 005 8701	DIODE ERA15-02A-V5
D5108	407 004 9709	DIODE DSK10C-BT
OR	407 088 6502	DIODE MPG06D-PKG3
OR	407 005 8701	DIODE ERA15-02A-V5
D5109	407 078 2705	DIODE 1SS244-T-77
D5110	407 078 2705	DIODE 1SS244-T-77
F5001 ⚠	423 004 6708	FUSE 250V0.315A
F5101 ⚠	423 004 3004	FUSE 250V 0.8A
F5102 ⚠	423 005 4901	FUSE 250V 1.6A
F5103 ⚠	423 006 1305	FUSE 250V 2A
F5104 ⚠	423 004 6708	FUSE 250V0.315A
L5001 ⚠	613 080 0664	LF CHOKE(VR 3721 VPS,3701 VPS)
OR ⚠	613 013 1409	LF CHOKE(VR 3721 VPS,3701 VPS)
R5101	401 007 8301	CARBON 1.5K JA 1/2W
R5102	401 007 8301	CARBON 1.5K JA 1/2W
COMPL,PW-2		
COMPL.NO.	613 108 4216	
IC521	409 214 4208	IC STK5446
IF PACK		
COMPL.NO.	613 107 0547	
C6103	403 021 0200	CERAMIC 3P C 50V
C6104	403 021 0200	CERAMIC 3P C 50V
C6105	403 006 6203	CERAMIC 1P C 50V
C6106	403 006 6203	CERAMIC 1P C 50V
C6107	403 071 8102	CERAMIC 2200P K 50V
C6108	403 069 1702	CERAMIC 1000P K 50V
C6109	403 023 4404	CERAMIC 330P J 50V
C6110	403 071 8102	CERAMIC 2200P K 50V
C6113	403 075 0706	CERAMIC 6800P K 50V
C6114	403 034 1409	CERAMIC 9P C 50V
C6115	403 070 9803	CERAMIC 0.015U K 50V
C6116	403 049 1005	ELECT 1U M 50V
C6117	403 069 1702	CERAMIC 1000P K 50V
C6119	403 075 0706	CERAMIC 6800P K 50V
C6120	403 053 9707	ELECT 4.7U M 35V
C6121	403 075 5305	CERAMIC 8200P K 50V
C6122	403 041 9603	ELECT 10U M 16V
C6123	403 075 0706	CERAMIC 6800P K 50V
C6124	403 069 5601	CERAMIC 0.01U K 50V
C6125	403 033 4500	CERAMIC 82P J 50V
C6127	403 022 8205	CERAMIC 33P J 50V
C6128	403 075 0706	CERAMIC 6800P K 50V
C6129	403 043 9700	ELECT 47U M 16V
C6130	403 017 0900	CERAMIC 20P J 50V
C6133	403 014 3409	CERAMIC 18P J 50V
C6134	403 026 2803	CERAMIC 47P J 50V
C6137	403 033 4708	CERAMIC 82P J 50V
C6138	403 075 0706	CERAMIC 6800P K 50V
C6139	403 047 9201	ELECT 0.1U M 50V
C6141	403 069 5601	CERAMIC 0.01U K 50V
C6142	403 075 0706	CERAMIC 6800P K 50V
C6143	403 012 6808	CERAMIC 15P J 50V
IC611	409 019 3307	IC LA7530N
L6102	613 014 0746	HF CHOKE 1.2UH M
L6103	613 098 8393	COIL,CHOKE 1.2UH
L6105	613 014 0869	HF CHOKE 12UH K
L6106	613 014 0869	HF CHOKE 12UH K
L6107	613 014 0869	HF CHOKE 12UH K
L6108	613 014 0913	HF CHOKE 33UH K
L6109	613 014 0845	HF CHOKE 8.2UH K

LOCATION	PARTS NO.	DESCRIPTION
Q6101	405 015 5505	TR 2SC2757-T1B-T33
Q6102	405 002 0209	TR 2SA1037K-Q
Q6103	405 021 2406	TR 2SD1048-X7-TB
R6101	401 037 7206	MT-GLAZE 130 JA 1/10W
R6102	401 014 2804	CARBON 150 JA 1/4W
R6103	401 038 0602	MT-GLAZE 220 JA 1/10W
R6104	401 037 7800	MT-GLAZE 150 JA 1/10W
R6105	401 039 0205	MT-GLAZE 82 JA 1/10W
R6106	401 038 9704	MT-GLAZE 7.5K JA 1/10W
R6107	401 037 7909	MT-GLAZE 1.5K JA 1/10W
R6108	401 037 5400	MT-GLAZE 1K JA 1/10W
R6109	401 038 0503	MT-GLAZE 22 JA 1/10W
R6110	401 037 7909	MT-GLAZE 1.5K JA 1/10W
R6111	401 038 6307	MT-GLAZE 470 JA 1/10W
R6112	401 038 2002	MT-GLAZE 270 JA 1/10W
R6113	401 038 0701	MT-GLAZE 2.2K JA 1/10W
R6114	401 038 7205	MT-GLAZE 5.1K JA 1/10W
R6115	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R6116	401 038 0800	MT-GLAZE 22K JA 1/10W
R6117	401 012 5609	CARBON 1K JA 1/4W
R6118	401 038 4105	MT-GLAZE 3.6K JA 1/10W
R6119	401 037 5400	MT-GLAZE 1K JA 1/10W
R6120	401 037 7305	MT-GLAZE 1.3K JA 1/10W
R6121	401 038 2002	MT-GLAZE 270 JA 1/10W
R6124	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R6126	401 037 7800	MT-GLAZE 150 JA 1/10W
R6128	401 037 5202	MT-GLAZE 100 JA 1/10W
R6129	401 038 3603	MT-GLAZE 3.3K JA 1/10W
R6130	401 037 5202	MT-GLAZE 100 JA 1/10W
R6132	401 037 7503	MT-GLAZE 130K JA 1/10W
R6133	401 037 5400	MT-GLAZE 1K JA 1/10W
R6134	401 012 6903	CARBON 10K JA 1/4W
R6135	401 037 8104	MT-GLAZE 150K JA 1/10W
R6136	401 038 0008	MT-GLAZE 200 JA 1/10W
R6137	401 037 7800	MT-GLAZE 150 JA 1/10W
R6138	401 037 7800	MT-GLAZE 150 JA 1/10W
T6101	613 098 8355	TRANS.IF
T6102	613 098 8362	TRANS.IF
T6103	613 098 8379	TRANS.IF
T6104	613 098 8386	TRANS.IF
VR611	613 001 9035	SEMI VR 10KB
XF611	421 002 9509	SAW F TSF1338L
XF612	613 084 1728	FILTER
XF613	613 110 1050	FILTER
XF614	613 084 1674	FILTER
XF615	613 098 8317	DISCR.CERAMIC 5.74M

COMPL,TN-7

COMPL.NO.	613 109 1030	
B6901	405 018 1900	TR 2SC3395-TB
OR	405 029 3504	TR DTC144EK-T96
C6901	403 068 0409	CERAMIC 0.1U Z 25V
C6902	403 189 2405	ELECT 10U M 16V
C6903	403 072 3403	CERAMIC 0.022U Z 50V
C6904	403 193 8400	ELECT 0.22U M 50V
C6921	403 068 0409	CERAMIC 0.1U Z 25V
C6922	403 014 9203	CERAMIC 180P J 50V
C6923	403 069 1702	CERAMIC 1000P K 50V
C6924	403 067 7300	MT-COMPO 0.33U J 50V
OR	403 115 1007	MT-POLYEST 0.33U J 63V
OR	403 168 6202	MT-POLYEST 0.33U J 50V
C6925	403 067 6709	MT-COMPO 0.22U J 50V
OR	403 065 8101	MT-POLYEST 0.22U J 63V

LOCATION	PARTS NO.	DESCRIPTION
C6925	403 184 9805	MT-POLYEST 0.22U J 50V
D6901	407 004 0706	DIODE DCB015-TB
OR	407 003 3609	DIODE DAN202K-T-96
D6902	407 003 5108	DIODE DA204K-T96
IC691	409 019 6209	IC LA7910
J6901	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
Q6901	405 015 8308	TR 2SC2812-L4-TB
OR	405 015 8407	TR 2SC2812-L5-TB
OR	405 014 4400	TR 2SC2412K-T96-Q
OR	405 014 4509	TR 2SC2412K-T96-R
Q6902	405 030 7201	TR 2SA1338-4-TB
OR	405 030 7300	TR 2SA1338-5-TB
Q6903	405 015 8308	TR 2SC2812-L4-TB
OR	405 015 8407	TR 2SC2812-L5-TB
OR	405 014 4400	TR 2SC2412K-T96-Q
OR	405 014 4509	TR 2SC2412K-T96-R
Q6921	405 084 8209	TR 2SC2960-F-SPA-AC
OR	405 084 8308	TR 2SC2960-G-SPA-AC
R6901	401 037 5400	MT-GLAZE 1K JA 1/10W
R6902	401 038 3504	MT-GLAZE 330 JA 1/10W
R6903	401 038 8509	MT-GLAZE 620 JA 1/10W
R6904	401 037 5608	MT-GLAZE 10K JA 1/10W
R6905	401 038 3801	MT-GLAZE 330K JA 1/10W
R6906	401 037 5608	MT-GLAZE 10K JA 1/10W
R6907	401 038 3603	MT-GLAZE 3.3K JA 1/10W
R6908	401 039 0205	MT-GLAZE 82 JA 1/10W
R6909	401 037 5400	MT-GLAZE 1K JA 1/10W
R6910	401 038 7106	MT-GLAZE 510 JA 1/10W
R6911	401 038 7700	MT-GLAZE 5.6K JA 1/10W
R6912	401 038 5102	MT-GLAZE 3.9K JA 1/10W
R6921	401 038 5102	MT-GLAZE 3.9K JA 1/10W
R6922	401 038 3702	MT-GLAZE 33K JA 1/10W
R6923	401 037 5608	MT-GLAZE 10K JA 1/10W
R6924	401 037 5608	MT-GLAZE 10K JA 1/10W
R6925	401 037 9309	MT-GLAZE 18K JA 1/10W
R6926	401 037 8005	MT-GLAZE 15K JA 1/10W
R6927	401 037 6803	MT-GLAZE 12K JA 1/10W
T6901	613 109 0958	TRANS.IF
OR	613 109 0965	TRANS.IF

COMPL,TM-1

COMPL.NO.	613 110 1791	
	613 077 3203	HOLDER
A7101	613 084 3203	FLUORESCENT TUBE
C7102	403 014 2501	CERAMIC 18P J 50V
C7103	403 017 0108	CERAMIC 20P J 50V
C7104	403 001 1609	CERAMIC 0.01U K 16V
C7105	403 139 1601	ELECT 22U M 16V
C7106	403 001 1609	CERAMIC 0.01U K 16V
C7107	403 001 1609	CERAMIC 0.01U K 16V
C7108	403 139 2608	ELECT 0.47U M 50V
C7111	403 121 9509	CERAMIC 0.1U Z 50V
C7113	403 139 1502	ELECT 10U M 16V
D7101	407 120 5807	DIODE AK04-V2
D7103	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D7104	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D7105	407 007 9904	DIODE GMA01-BT

LOCATION	PARTS NO.	DESCRIPTION
D7105	407 012 4406	DIODE 1SS133-T-77
D7107	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D7108	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
D7110	407 007 9904	DIODE GMA01-BT
OR	407 012 4406	DIODE 1SS133-T-77
IC711	409 216 2905	IC M50958-294SP
IC712	409 032 3308	IC MN1280-L
R7101	401 012 9201	CARBON 1M JA 1/4W
R7102	401 110 6201	CARBON 10M JA 1/4W
R7103	401 018 5702	CARBON 330K JA 1/4W
R7104	401 012 5609	CARBON 1K JA 1/4W
R7105	401 012 6903	CARBON 10K JA 1/4W
R7106	401 012 5609	CARBON 1K JA 1/4W
R7107	401 012 6903	CARBON 10K JA 1/4W
R7108	401 012 5609	CARBON 1K JA 1/4W
R7109	401 012 6903	CARBON 10K JA 1/4W
R7110	401 012 5609	CARBON 1K JA 1/4W
R7111	401 012 6903	CARBON 10K JA 1/4W
R7112	401 012 6903	CARBON 10K JA 1/4W
R7114	401 012 6903	CARBON 10K JA 1/4W
R7115	401 012 6903	CARBON 10K JA 1/4W
R7116	401 016 4707	CARBON 22K JA 1/4W
R7117	401 012 6903	CARBON 10K JA 1/4W
R7118	401 012 5609	CARBON 1K JA 1/4W
R7119	401 012 5609	CARBON 1K JA 1/4W
R7121	401 012 6903	CARBON 10K JA 1/4W
R7122	401 012 5609	CARBON 1K JA 1/4W
R7123	401 012 5609	CARBON 1K JA 1/4W
R7124	401 018 4804	CARBON 33K JA 1/4W
R7126	401 012 6903	CARBON 10K JA 1/4W
R7127	401 012 6903	CARBON 10K JA 1/4W
R7132	401 012 6903	CARBON 10K JA 1/4W
R7133	401 018 5702	CARBON 330K JA 1/4W
RR711	613 094 0421	IR RECEIVER PACK
S7101	613 079 4130	SW,PUSH
OR	613 006 3649	PUSH SWITCH
OR	613 092 0751	SW,PUSH
OR	613 092 1734	SW,PUSH
S7102	613 079 4130	SW,PUSH
OR	613 006 3649	PUSH SWITCH
OR	613 092 0751	SW,PUSH
OR	613 092 1734	SW,PUSH
S7103	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7106	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7108	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7113	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7114	613 079 4130	SW,PUSH
OR	613 006 3649	PUSH SWITCH
OR	613 092 0751	SW,PUSH
OR	613 092 1734	SW,PUSH
S7115	613 079 4130	SW,PUSH
OR	613 006 3649	PUSH SWITCH
OR	613 092 0751	SW,PUSH
OR	613 092 1734	SW,PUSH
S7118	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7120	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7125	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7126	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7129	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7130	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7137	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
X7101	613 089 4069	RESONATOR,CERAMIC 6MHZ
OR	613 108 9570	RESONATOR,CERAMIC 6MHZ
X7102	613 109 0972	OSC,CRYSTAL 32KHZ

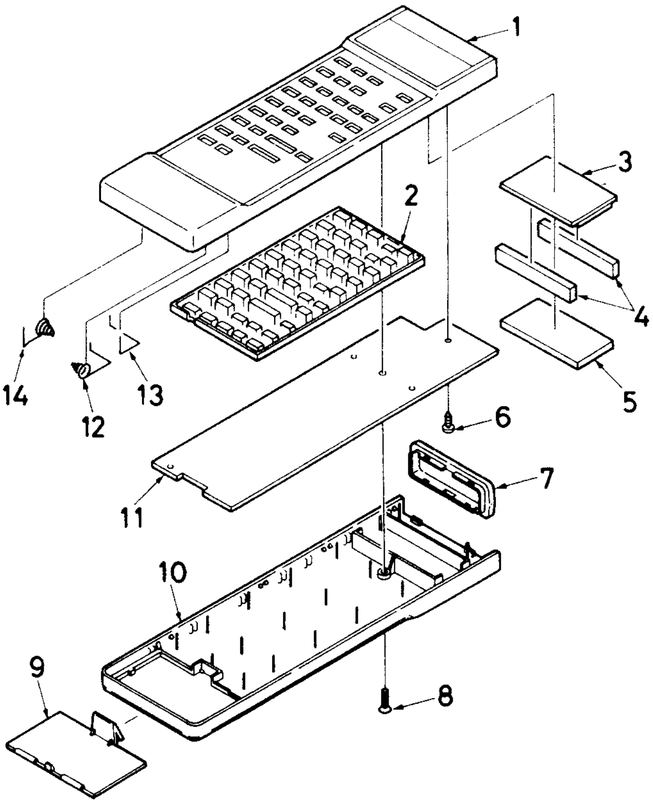
COMPL,TM-2

COMPL.NO. 613 110 1814

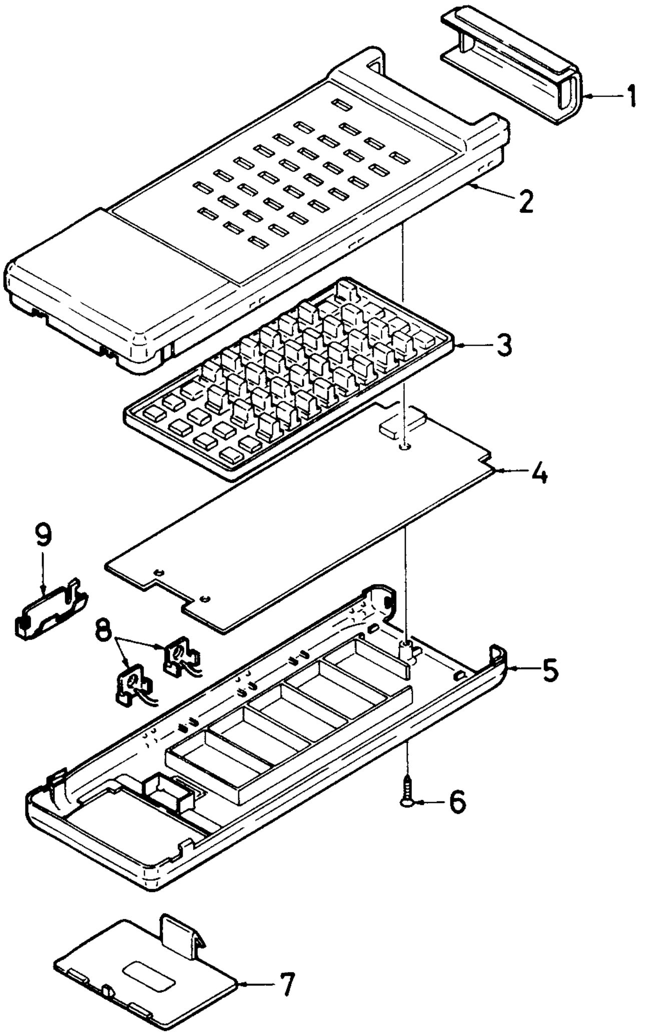
S7101	613 079 4130	SW,PUSH
OR	613 006 3649	PUSH SWITCH
OR	613 092 0751	SW,PUSH
OR	613 092 1734	SW,PUSH
S7102	613 079 4130	SW,PUSH
OR	613 006 3649	PUSH SWITCH
OR	613 092 0751	SW,PUSH
OR	613 092 1734	SW,PUSH
S7103	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7113	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7115	613 079 4130	SW,PUSH
OR	613 006 3649	PUSH SWITCH
OR	613 092 0751	SW,PUSH
OR	613 092 1734	SW,PUSH
S7125	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH
S7126	613 079 4154	SW,PUSH
OR	613 077 4354	PUSH SWITCH
OR	613 092 0768	SW,PUSH
OR	613 092 0744	SW,PUSH

LOCATION	PARTS NO.	DESCRIPTION
COMPL,TM-8,VPS PCB		
COMPL.NO.	613 108 5534	(VR 3721 VPS,3701 VPS)
C7802	403 013 3103	CERAMIC 150P J 50V
C7803	403 067 7300	MT-COMPO 0.33U J 50V
OR	403 115 1007	MT-POLYEST 0.33U J 63V
OR	403 168 6202	MT-POLYEST 0.33U J 50V
C7804	403 057 2407	POLYESTER 0.1U J 50V
C7805	403 068 0409	CERAMIC 0.1U Z 25V
C7806	403 193 7502	ELECT 22U M 6.3V
IC781	409 148 5104	IC SDA5642
Q7801	405 015 8407	TR 2SC2812-L5-TB
OR	405 015 8704	TR 2SC2812-L6-TB
OR	405 014 4400	TR 2SC2412K-T96-Q
OR	405 014 4509	TR 2SC2412K-T96-R
R7801	401 038 6307	MT-GLAZE 470 JA 1/10W
R7802	401 037 5400	MT-GLAZE 1K JA 1/10W
R7803	401 037 5400	MT-GLAZE 1K JA 1/10W
R7804	401 037 9101	MT-GLAZE 180 JA 1/10W
R7805	401 038 0701	MT-GLAZE 2.2K JA 1/10W
R7806	401 037 5806	MT-GLAZE 1M JA 1/10W
R7807	401 039 0601	MT-GLAZE 820K JA 1/10W
R7808	401 037 5707	MT-GLAZE 100K JA 1/10W
R7809	401 037 5608	MT-GLAZE 10K JA 1/10W
R7810	401 037 7008	MT-GLAZE 1.2M JA 1/10W
R7811	401 037 5202	MT-GLAZE 100 JA 1/10W
R7812	401 038 7700	MT-GLAZE 5.6K JA 1/10W
REMOCON		
COMPL.NO.	613 110 3481	(VR 3721 VPS.3721)
COMPL.NO.	613 110 3504	(VR 3721 LX)
1	613 112 4479	ASSY.CABINET,TOP(VR 3721 VPS,3721)
OR	613 112 4493	ASSY.CABINET,TOP(VR 3721 LX)
2	613 112 3731	BUTTON(VR 3721 VPS,3721)
OR	613 112 3748	BUTTON(VR 3721 LX)
3	613 087 0087	LCD
4	613 080 9520	CONNECTOR
5	613 080 9728	SPACER
6	411 022 7807	SCR S-TPG PAN 2X6
7	613 080 9681	SIGN WINDOW
8	411 101 7308	SCR S-TPG FLT 2.6X10
9	613 040 1724	BATTERY LID
10	613 040 0727	BOTTOM LID
11	613 110 1128	COMPL.RM-1
12	613 080 9759	TERMINAL,-(INCLUDE RM-1)
13	613 080 9742	TERMINAL,+(INCLUDE RM-1)
14	613 080 9735	TERMINAL
COMPL,RM-1		
COMPL.NO.	613 110 1128	(VR 3721 VPS,3721,3721 LX)
C1	403 068 0409	CERAMIC 0.1U Z 25V
C2	403 049 0800	ELECT 1U M 50V
C3	613 087 2043	CAP,TRIM 20P
C4	403 068 0409	CERAMIC 0.1U Z 25V
C5	403 068 0409	CERAMIC 0.1U Z 25V
C6	403 068 0409	CERAMIC 0.1U Z 25V
C7	403 038 1603	ELECT 100U M 6.3V
IC1	409 218 2309	IC LC5863H-1120
IC2	409 129 3402	IC UPD74HC08G
OR	409 208 1909	IC MLC74HC08AM
OR	409 221 3102	IC MC74HC08AF
LED1	407 040 3709	LED SLR-932A

LOCATION	PARTS NO.	DESCRIPTION
Q1	405 021 2406	TR 2SD1048-X7-TB
OR	405 021 2505	TR 2SD1048-X8-TB
R1	401 037 5202	MT-GLAZE 100 JA 1/10W
R2	401 015 6405	CARBON 2.2 JA 1/4W
R3	401 037 5202	MT-GLAZE 100 JA 1/10W
R5	401 039 0601	MT-GLAZE 820K JA 1/10W
X1	613 082 8156	OSC,CRYSTAL 38.2293KHZ

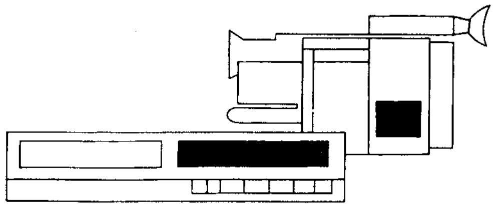


LOCATION	PARTS NO.	DESCRIPTION
REMOCON		
COMPL.NO.	613 111 3565	(VR 3701 VPS,3701)
COMPL.NO.	613 111 3572	(VR 3701 LX)
1	613 040 5395	SIGN,WINDOW
2	613 112 5421	ASSY,CABINET,TOP(VR 3701 VPS,3701)
OR	613 112 5438	ASSY,CABINET,TOP(VR 3701 LX)
3	613 112 4769	BUTTON(VR 3701 VPS,3701)
OR	613 112 4752	BUTTON(VR 3701 LX)
4	613 110 9544	COMPL,RM-1
5	613 040 0703	BOTTOM LID
6	411 101 7506	SCR S-TPG FLT 2.6X12
7	613 040 1663	BATTERY LID
8	613 052 5390	TERMINAL(INCLUDE RM-1)
9	613 052 5383	TERMINAL



LOCATION	PARTS NO.	DESCRIPTION
COMPL,RM-1		
COMPL.NO.	613 110 9544	(VR 3701 VPS,VR 3701,VR 3701 LX)
C1	403 009 3100	CERAMIC 100P J 50V
C2	403 009 3100	CERAMIC 100P J 50V
C3	403 039 2104	ELECT 47U M 6.3V
C4	403 001 2903	CERAMIC 0.1U M 16V
IC1	409 220 8108	IC UPD6124G-797
LED1	407 040 3709	LED SLR-932A
Q1	405 066 7305	TR 2SC4040-R
OR	405 015 3006	TR 2SC2673-R
OR	405 015 3105	TR 2SC2673-S
R1	401 015 6405	CARBON 2.2 JA 1/4W
X1	613 016 6913	CERAMIC RESONATOR CSB455EB
OR	613 016 6920	CERAMIC RESONATOR KBR455BT

NOKIA
CONSUMER ELECTRONICS



VR

1990

NOKIA UNTERHALTUNGSELEKTRONIK GmbH
Service, Östliche 132, Postfach 1526
D-7530 Pforzheim

Service-Manual

ITT NOKIA

VR 3701, 3701 VPS, 3701 V, 3701 UK, 3701 H
VR 3721, 3721 VPS, 3721 UK
VR 3731, 3731 VPS, 3731 UK
VR 3761 HIFI VPS, 3761 HIFI UK
VR 3761 HIFI NICAM
VR 3781 HIFI VPS, 3781 HIFI NICAM

Luxor

VR 3701 LX, 3721 LX
VR 3731 LX
VR 3761 HIFI NICAM LX
VR 3781 HIFI NICAM LX

OCEANIC

VR 3701 S, 3721 S
VR 3741 MS, 3751 MS

Ⓓ Mechanik-Justagen

Schaltbilder, Leiterplatten, Ersatzteile-Liste und elektrischer Abgleich, siehe Rückseite

⚠ **Sicherheitsbauteil!**
Dieses Symbol kennzeichnet in den Schaltbildern alle Bauteile, die nur durch Originalteile ersetzt werden dürfen.

Bei Reparaturen gültige Sicherheitsvorschriften beachten!

(GB) Mechanical adjustments

Circuit diagrams, P.C.B., spare parts list and electrical alignment, see rear page

⚠ **Safety Component!**
This symbol identifies in the circuit diagrams all safety critical parts. Replace only with specified part numbers.

Service and repair work to be performed only in accordance with existing safety regulations!

Ⓕ Mécanique ajustages

Schémas, circuits imprimés, liste des pièces détachées et alignement, voir page précédante

⚠ **Composant de protection!**
Ce symbol indique tous les composants dans les schémas, qui doivent être remplacés uniquement par des pièces d'origines.

Pendant le dépannage respecter les régulations du sécurité!

Änderungen vorbehalten
Modifications reserved
Modifications réservées

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6611 77 06
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Liste der Service-Manuale
Liste of Service Manuals
Liste des manuals

	Modell Model Modèle	Schaltbilder, Leiterplatten, Ersatzteile-Liste Circ. diagr., P.C.B.,spare parts list Schémas circ. imprimés, liste des pièces détachées No.	Elektrischer Abgleich Electrical alignment Alignement No.	Mechanik-Justagen Mechanical adjustments Mécanique ajustages No.
ITT NOKIA	VR 3701 VPS	6611 77 04	6611 77 05	6611 77 06
LUXOR	VR 3701 LX			
ITT NOKIA	VR 3701			
ITT NOKIA	VR 3721 VPS			
LUXOR	VR 3721 LX			
ITT NOKIA	VR 3721			
ITT NOKIA	VR 3701 UK	6611 77 07		
ITT NOKIA	VR 3701 V			
ITT NOKIA	VR 3721 UK			
ITT NOKIA	VR 3701 H	6611 77 08		
ITT NOKIA	VR 3731 VPS	6611 77 09	6611 77 10	
ITT NOKIA	VR 3731			
LUXOR	VR 3731 LX			
ITT NOKIA	VR 3731 UK	6611 77 11		
ITT NOKIA	VR 3761 HIFI VPS	6611 77 12	6611 77 13	
ITT NOKIA	VR 3761 HIFI NICAM	6611 77 14		
LUXOR	VR 3761 HIFI NICAM LX			
ITT NOKIA	VR 3761 HIFI UK	6611 77 15		
ITT NOKIA	VR 3781 HIFI VPS	6611 77 16	6611 77 17	
ITT NOKIA	VR 3781 HIFI NICAM	6611 77 18		
LUXOR	VR 3781 HIFI NICAM LX			
OCEANIC	VR 3721 S	6611 77 19	6611 77 20	
OCEANIC	VR 3701 S			
OCEANIC	VR 3741 MS	6611 77 21		
OCEANIC	VR 3751 MS	6611 77 22	6611 77 23	

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1. OUTLINE OF MECHANISM

This mechanism is named P-90 Mechanism. Its features include :

(1) The chassis is fabricated by drawing a 1.6mm thick electric zinc plated steel sheet, and mechanical parts are ingeniously laid on this chassis. The mechanism is as thick as 70.3 mm.

(2) After insertion of a cassette, the tape is normally wound to the head drum based on the full loading system. This design results in the shortening of the mode shift time, that is, the time from the depression of the PLAY pushbutton switch to the video image display on screen has been significantly quickened.

(3) The full loading system employed has the F/R search capability (when the same button (F.FWD or REW) is pressed in the F.FWD or REW modes, the search mode playback image appears on the screen).

(4) Also, a thin type head drum without lead is provided to increase the operating convenience of the equipment to a considerable extent.

(5) The drive source for cassette loading and the motor for the tape loading mode selection are used in combination with the head motor and the capstan motor for realization of a 3-motor system.

1-1. FULL LOADING MECHANISM

(1) Description of full loading mechanism
As shown in Fig. 1-1 a tape has hitherto been wound onto the head drum only in the PLAY and F/R SEARCH mode, but in this radically new mechanism, in every mode can be made with the tape kept wound onto the head drum.

(2) Features of full loading mechanism
With the provision of the full loading mechanism, the operating convenience, which was hitherto a drawback of the VHS system, has been improved. A host of other salient features are also designed into this mechanism as apparent from the following description.

I. Quick playback
Mode shift time such as the STOP→PLAY and FF/REW→PLAY has been shortened for quicker playback.

II. High-speed VISS
The time from the detection of VISS search signal based on the VHS standardized search system till image display on the screen has considerably been shortened to make high-speed VISS possible.

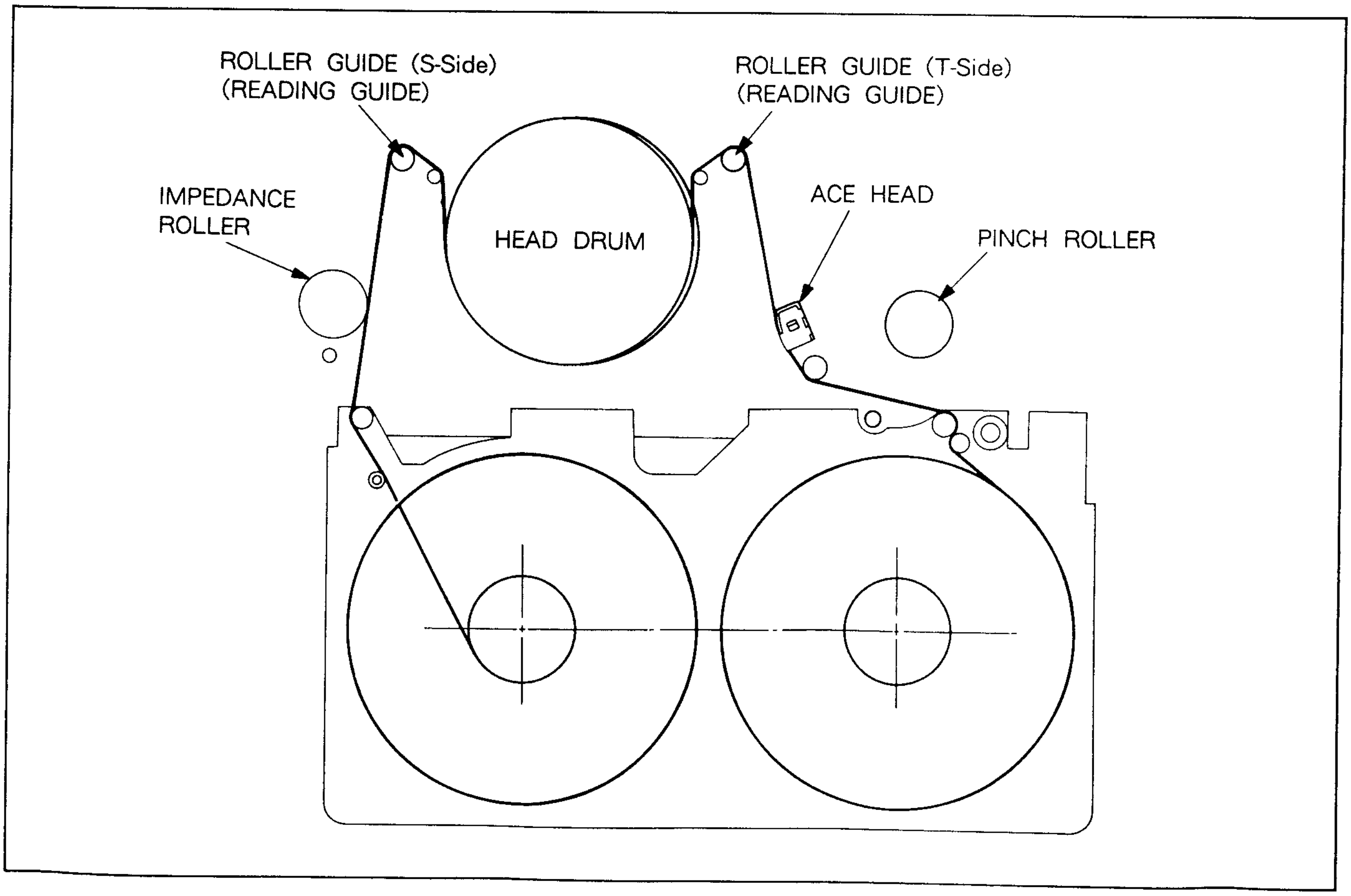


Fig. 1-1 FULL LOADING SYSTEM (AT FF/REW MODE)

III. F/R search
FF↔F-SEARCH and REW↔R-SEARCH can be made direct by reducing the mode transition time.

(3) Protection mechanism for full loading system

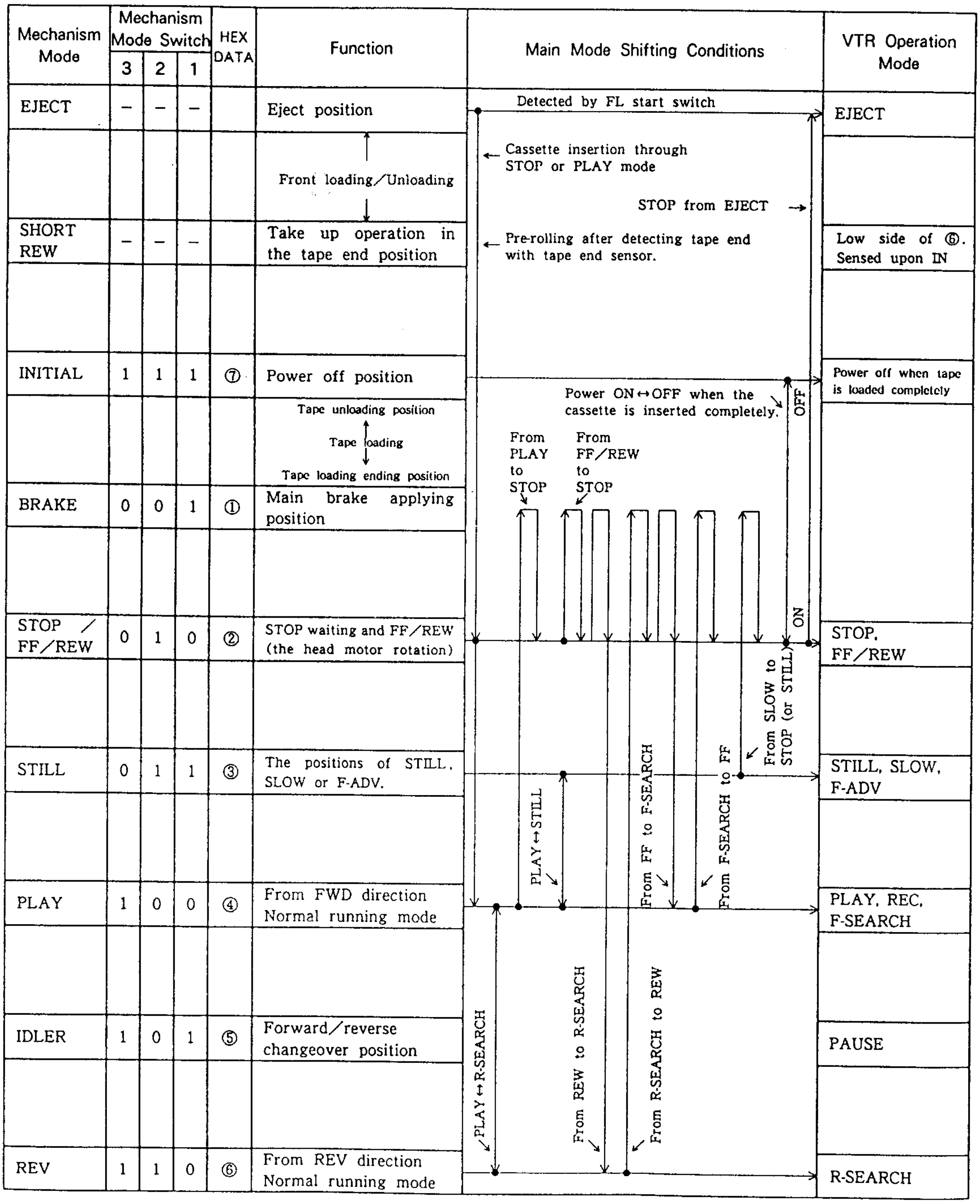
I. Video Tape Protection Mechanism
(a) FF/REW→STOP
Tape tension applied to the head drum when stopping is lowered by optimizing the balance between the left and right, and brake forces acting on the left and right reel table. Thereby it prevents from causing a scratch on the tape due to V-head when stopping.
(b) STOP→FF/REW
The starting-up speed of the capstan motor is ingeniously designed to preclude the possibility of unusual tape tension at the time of REW/FWD start-up.
(c) Tape end brake damping
The design of the mechanism is so made that the time from issuance of an electrical STOP command till actual brake application is reduced to a minimum. This enable the braking to be completed before the reader tape end.
(d) FF/REW running
To ensure highly stable tape running in any condition• and any environment, design consideration is given to the foundation brake torque (soft brake) to the reel table and the tape winding angle with respect to each tape guide. Particularly in regard to the supply side fixing guide and F.T.E (Full Track Erase) head, the design is so made that they do not come into contact with the tape at the time of FF/REW operation to alleviate load application.

II. Final End Position Tape Loading Protection Mechanism
Tape pull-out (loading) from within the cassette is done to ensure proper take-up of the tape onto the head drum. At that time, the tape is extended from the supply reel side.
So, if the tape is wound to the final end, no loading can be made. For this reason, a mode is designed to allow the tape to be rewound a little at the final end of the tape without any loading done.

2. DESCRIPTION OF MECHANISM OPERATION

2-1. BASIC OPERATION MODE OF MECHANISM

The P-90 mechanism has its original modes such as given in Table 2-1, in addition to the VTR is operation modes (STOP, FF, REW, PLAY, REC, R-SEARCH, F-SEARCH, STILL, SLOW, and ETS). These modes specific to the mechanism play important roles in tape protection operation at the time of a shift to various modes of the VTR above. A shift to the mode specific to the mechanism is carried out by controlling the rotation of the loading motor with the control signal of the system control circuit. The detection of important mechanism operation mode positions is done by using the FL START SWITCH for detecting the cassette ejection/insertion, and the MECHANISM MODE SWITCH for detecting each mode of the mechanism (3 bit MODE DATA is output by operating the rotary switch).



Mechanism Mode	Mechanism Mode Switch 3	2	1	HEX DATA	Function	Main Mode Shifting Conditions	VTR Operation Mode
EJECT	–	–	–		Eject position	Detected by FL start switch	EJECT
					Front loading/Unloading	Cassette insertion through STOP or PLAY mode STOP from EJECT	
SHORT REW	–	–	–		Take up operation in the tape end position	Pre-rolling after detecting tape end with tape end sensor.	Low side of ⑥. Sensed upon IN
INITIAL	1	1	1	⑦	Power off position	Power ON↔OFF when the cassette is inserted completely. OFF	Power off when tape is loaded completely
					Tape unloading position Tape loading Tape loading ending position	From PLAY to STOP From FF/REW to STOP	
BRAKE	0	0	1	①	Main brake applying position		
STOP / FF/REW	0	1	0	②	STOP waiting and FF/REW (the head motor rotation)	ON	STOP, FF/REW
						From SLOW to STOP (or STILL)	
STILL	0	1	1	③	The positions of STILL, SLOW or F-ADV.		STILL, SLOW, F-ADV
						PLAY↔STILL From FF to F-SEARCH From F-SEARCH to FF	
PLAY	1	0	0	④	From FWD direction Normal running mode		PLAY, REC, F-SEARCH
IDLER	1	0	1	⑤	Forward/reverse changeover position	PLAY↔R-SEARCH From REW to R-SEARCH From R-SEARCH to REW	PAUSE
REV	1	1	0	⑥	From REV direction Normal running mode		R-SEARCH

Table 2-1

2-2. DESCRIPTION OF MECHANISM DRIVE

To realize the thin type mechanism, a loading motor and two pieces of cam (MAIN CAM GEAR and the MODE CAM GEAR) to be driven by the said motor are mounted on the upper part of the capstan motor, that was a dead space in the conventional mechanisms hitherto available with a view to optimization of parts mounting layout. (Fig. 2-1 and Fig. 2-2.)

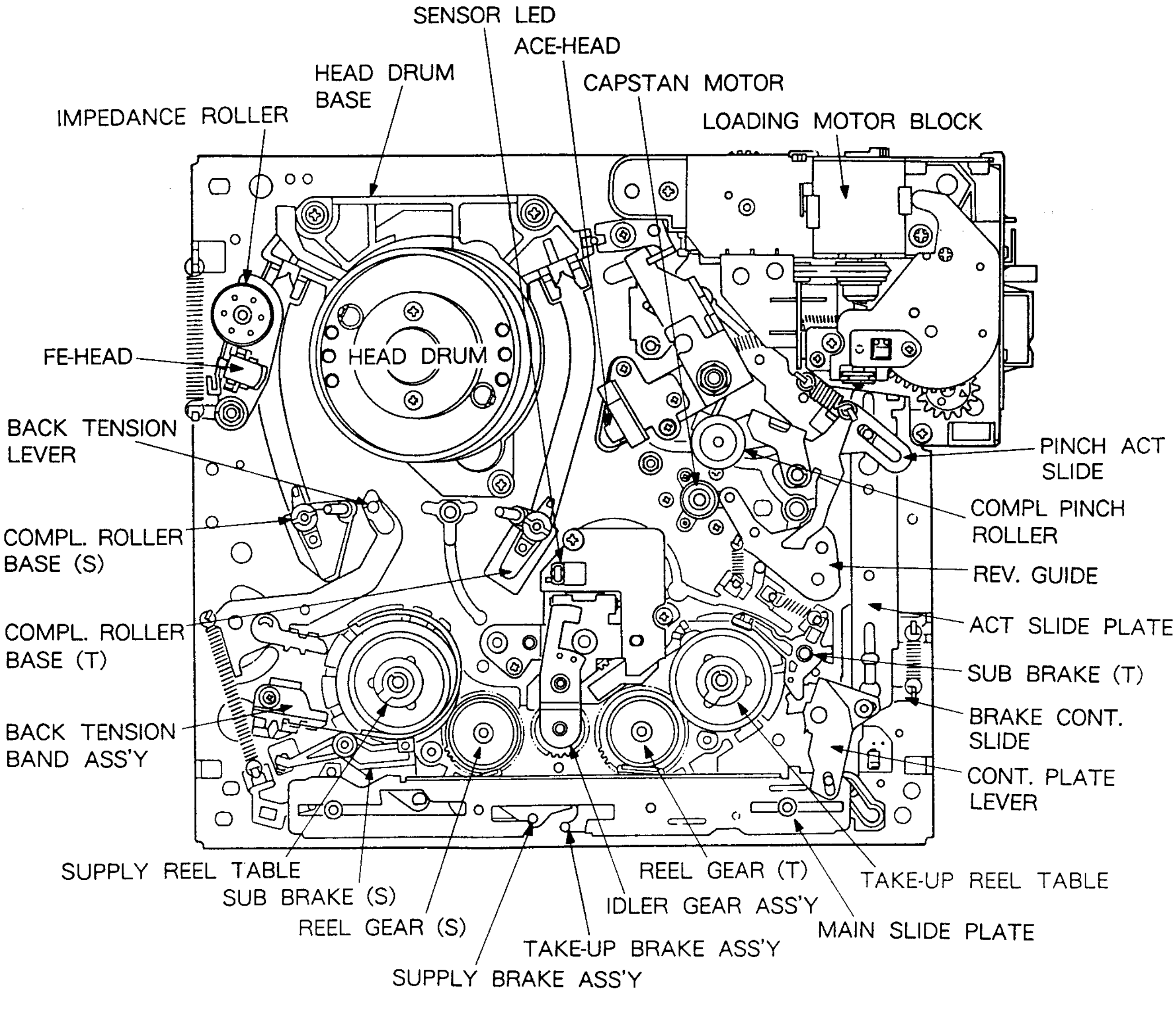

SENSOR LED
ACE-HEAD
HEAD DRUM BASE
CAPSTAN MOTOR
IMPEDANCE ROLLER
LOADING MOTOR BLOCK
FE-HEAD
HEAD DRUM
BACK TENSION LEVER
PINCH ACT SLIDE
COMPL PINCH ROLLER
COMPL. ROLLER BASE (S)
REV. GUIDE
COMPL. ROLLER BASE (T)
ACT SLIDE PLATE
SUB BRAKE (T)
BACK TENSION BAND ASS'Y
BRAKE CONT. SLIDE
CONT. PLATE LEVER
SUPPLY REEL TABLE
REEL GEAR (T)
TAKE-UP REEL TABLE
SUB BRAKE (S)
IDLER GEAR ASS'Y
REEL GEAR (S)
MAIN SLIDE PLATE
TAKE-UP BRAKE ASS'Y
SUPPLY BRAKE ASS'Y
FRONT

Fig. 2-1 TOP VIEW OF MECHANISM (INITIAL MODE)

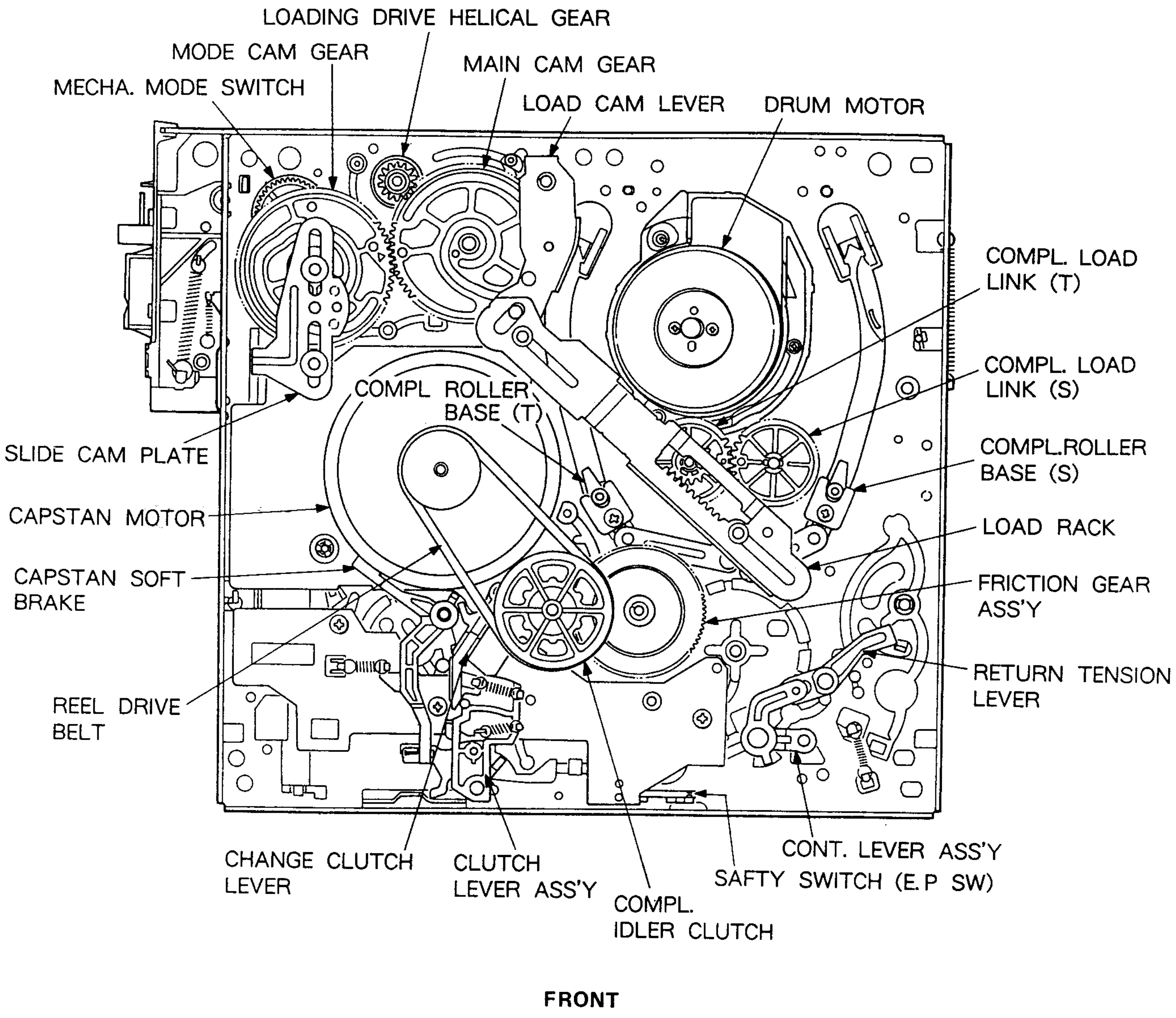

LOADING DRIVE HELICAL GEAR
MODE CAM GEAR
MECHA. MODE SWITCH
MAIN CAM GEAR
LOAD CAM LEVER
DRUM MOTOR
COMPL. LOAD LINK (T)
COMPL. LOAD LINK (S)
COMPL.ROLLER BASE (S)
LOAD RACK
FRICTION GEAR ASS'Y
RETURN TENSION LEVER
COMPL ROLLER BASE (T)
SLIDE CAM PLATE
CAPSTAN MOTOR
CAPSTAN SOFT BRAKE
REEL DRIVE BELT
CHANGE CLUTCH LEVER
CLUTCH LEVER ASS'Y
COMPL. IDLER CLUTCH
CONT. LEVER ASS'Y
SAFTY SWITCH (E.P SW)
FRONT

Fig. 2-2 BOTTOM VIEW OF MECHANISM (INITIAL MODE)

These two cams have one CAM GROOVE on both sides. A total of four CAM GROOVEs performs independent functions to meet the multi-function needs of these days by driving the elements of a wide variety of functions with the motor precisely controlled by a microcomputer.
The two cams are positive motion cams having a groove over 570 degrees. These cams cause the amount of lift to be changed by a mild gradient according to the angle of rotation while synchronizedly being rotated by an outer circumferential gear to alleviate the load exerted on the cams when driving the rod linked with the cams and also to ensure position stability in each mode of operation. The geometry of each cam and that of a metal fitting of the drive section are shown in Fig. 2-3 and Fig. 2-4, respectively. Also, the role of each cam used is described below.
On the GROOVE 3 side of MODE CAM GEAR have a small gear. This small gear is engaged with the MECHANISM MODE SWITCH as shown in Fig. 2-3., and detect the mechanism operation mode. In this way, the two cams and the MECHANISM MODE SWITCH are rotated synchronously, and the mechanism is fully synchronized and driven for each mode.

MAIN CAM GEAR : CAM GROOVE 1.
Pinch roller pressing operation
CAM GROOVE 2.
Tape loading mechanical drive
MODE CAM GEAR : CAM GROOVE 3.
Brake and clutch selecting operation
CAM GROOVE 4.
Brake control and front unloading control

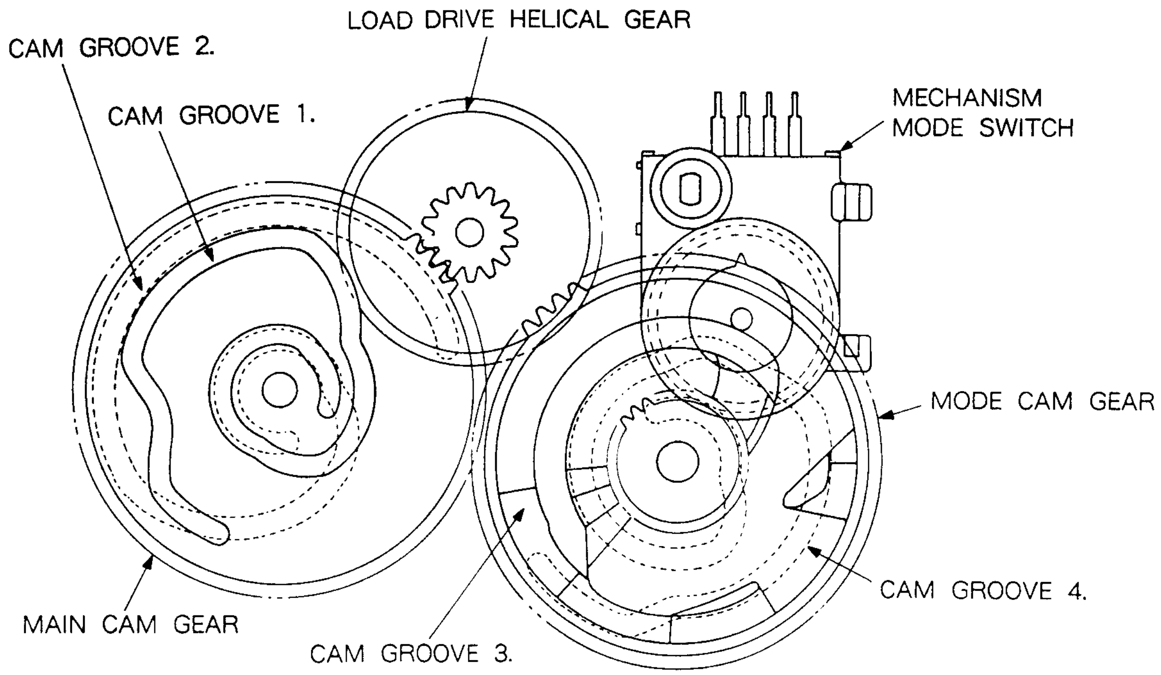


Fig. 2-3 PLAN OF CAMS CONSTRUCTION

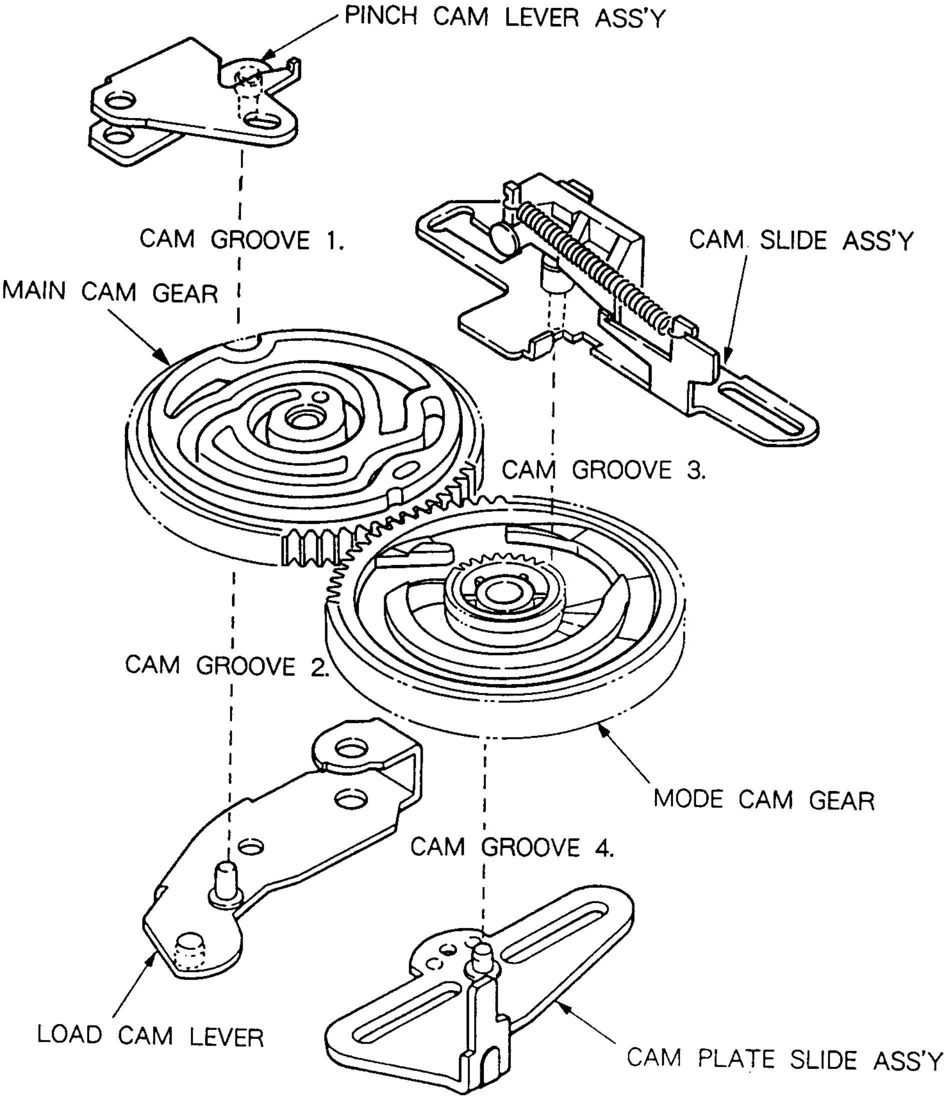

PINCH CAM LEVER ASS'Y
CAM GROOVE 1.
MAIN CAM GEAR
CAM SLIDE ASS'Y
CAM GROOVE 3.
CAM GROOVE 2.
MODE CAM GEAR
CAM GROOVE 4.
LOAD CAM LEVER
CAM PLATE SLIDE ASS'Y

Fig. 2-4 VIEW OF CAMS CONSTRUCTION

2-2-1. Tape Loading Mechanism

The tape loading mechanism is compactly designed with use of a LOAD RACK for loading by drive from the before-mentioned MAIN CAMs with CAM GROOVE 2. The LOAD RACK is laid on the dead space in between the DD capstan motor and the head motor for effective space utilization.(Fig. 2-5) The process from tape pull-out upon loading to contact of the leading guide section with the stopper of drum base and press-fitting under tension of spring is guided and driven in such a manner that the rod is drawn inward from the outer circumferential direction of the CAM GROOVE 2, thereby reducing the load torque (PV value) to the CAM GROOVE. And, the load of the loading motor is minimized to enhance reliability.

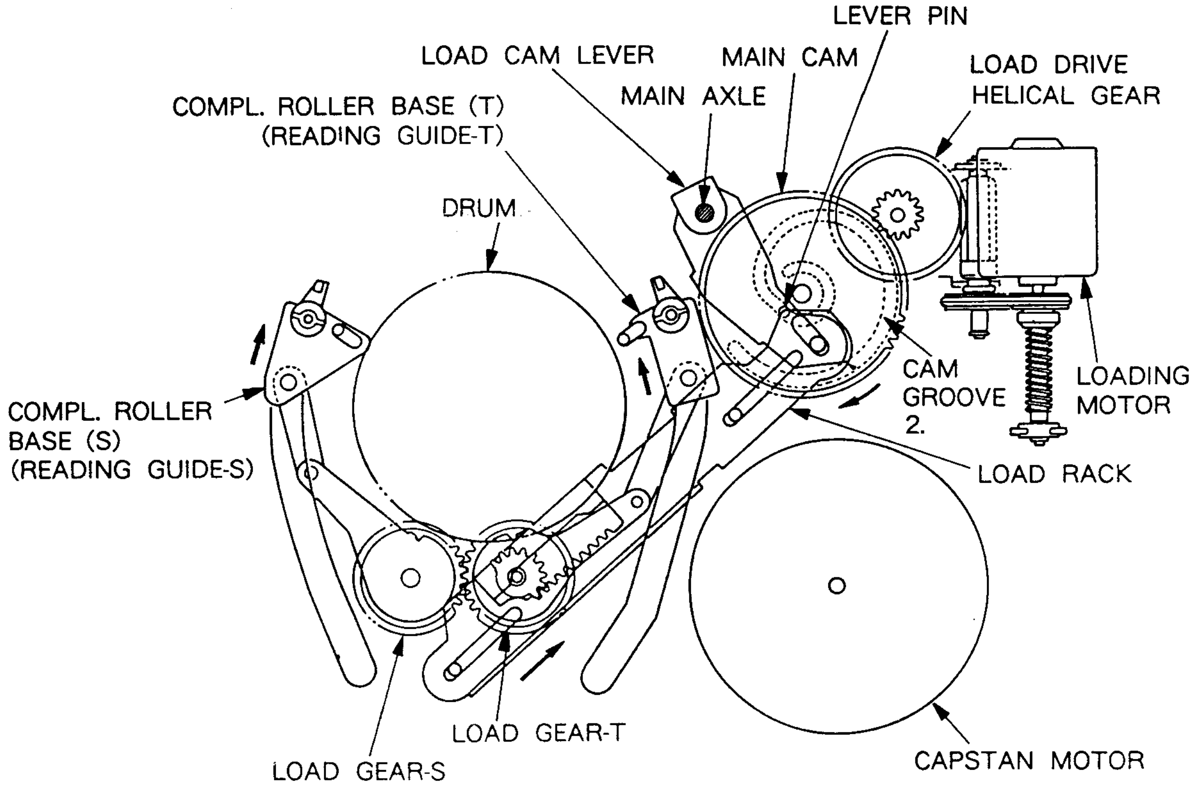

LEVER PIN
LOAD CAM LEVER
MAIN CAM
LOAD DRIVE HELICAL GEAR
MAIN AXLE
COMPL. ROLLER BASE (T) (READING GUIDE-T)
DRUM
CAM GROOVE 2.
LOADING MOTOR
COMPL. ROLLER BASE (S) (READING GUIDE-S)
LOAD RACK
LOAD GEAR-T
LOAD GEAR-S
CAPSTAN MOTOR

Fig. 2-5 CONSTRUCTION OF TAPE LOADING MECHANISM

2-2-2. Pinch Roller Pressing Mechanism

The PINCH LEVER assembly of the pinch roller is operated by the PINCH CAM LEVER (rod) driven by the CAM GROOVE 1 of the before-mentioned MAIN CAM, and then press-fitted to the capstan. The revolving tape guide (REV.GUIDE) is interlockingly operated with the PINCH LEVER assembly to ensure stable tape running at a fixed speed. (Fig. 2-6)

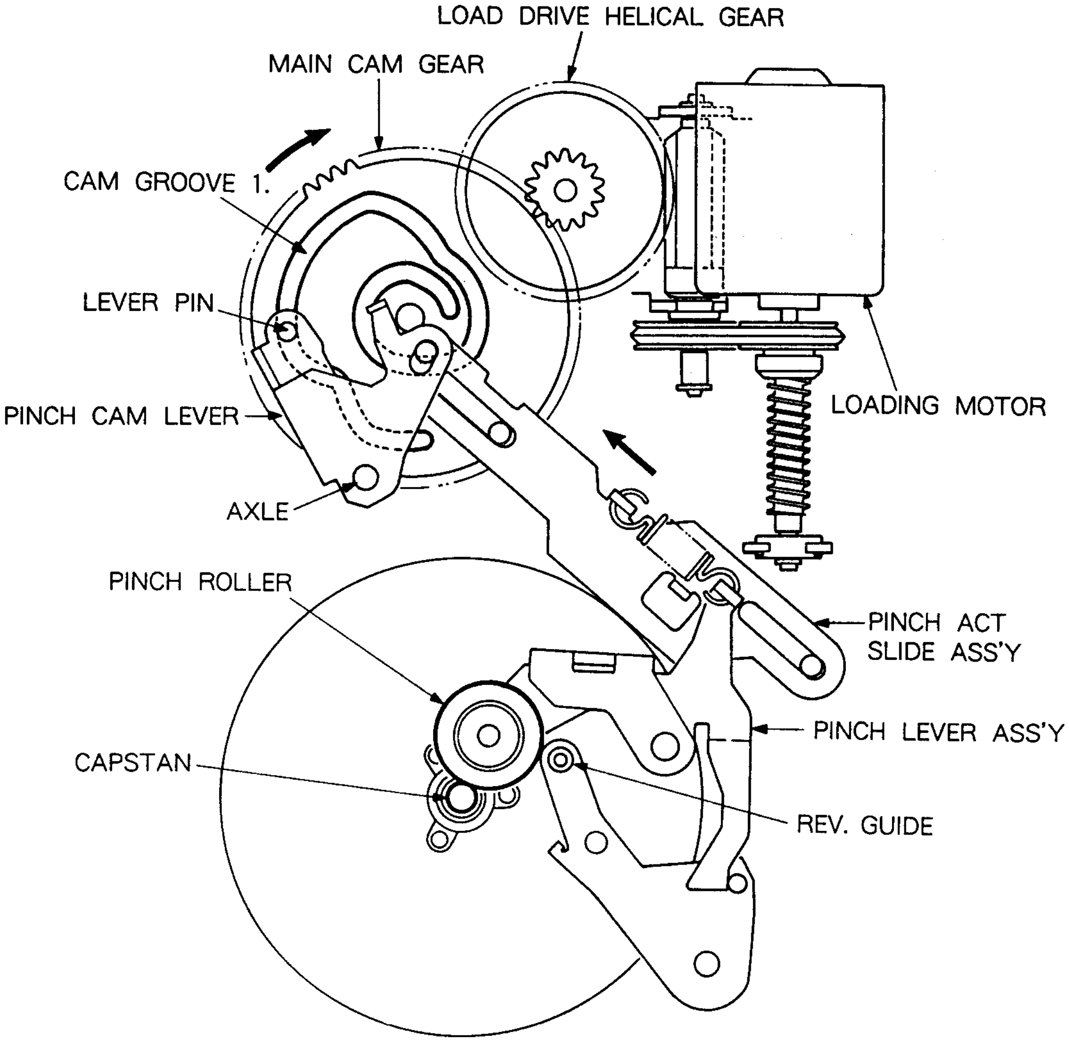

LOAD DRIVE HELICAL GEAR
MAIN CAM GEAR
CAM GROOVE 1.
LEVER PIN
PINCH CAM LEVER
AXLE
PINCH ROLLER
CAPSTAN
LOADING MOTOR
PINCH ACT SLIDE ASS'Y
PINCH LEVER ASS'Y
REV. GUIDE

Fig. 2-6 CONSTRUCTION OF PINCH ROLLER MECHANISM

2-2-3. Operation of Brake Control Plate

The ACT SLIDE PLATE and the MAIN SLIDE PLATE shown in Fig. 2-7 is driven by the CAM GROOVE 4 of the MODE CAM GEAR for precise control of operations including the control of back tension lever, auxiliary brake (SUB BRAKE S/T), main brake (SUPPLY BRAKE and TAKE-UP BRAKE), clutch selection, and drive selection of front loading mechanism.

Also, the mechanism mode switch is engaged with the small gear of the MODE CAM GEAR for sync rotation. At the time, the detection position of each mode is set so that it becomes the flat section at the cam curve of the CAM GROOVE 4 of the MODE CAM GEAR. So, even if motor stop time deviation occurs due to the load following the detection of the loading motor stop position, the control plate linked with a stop in the specified position.

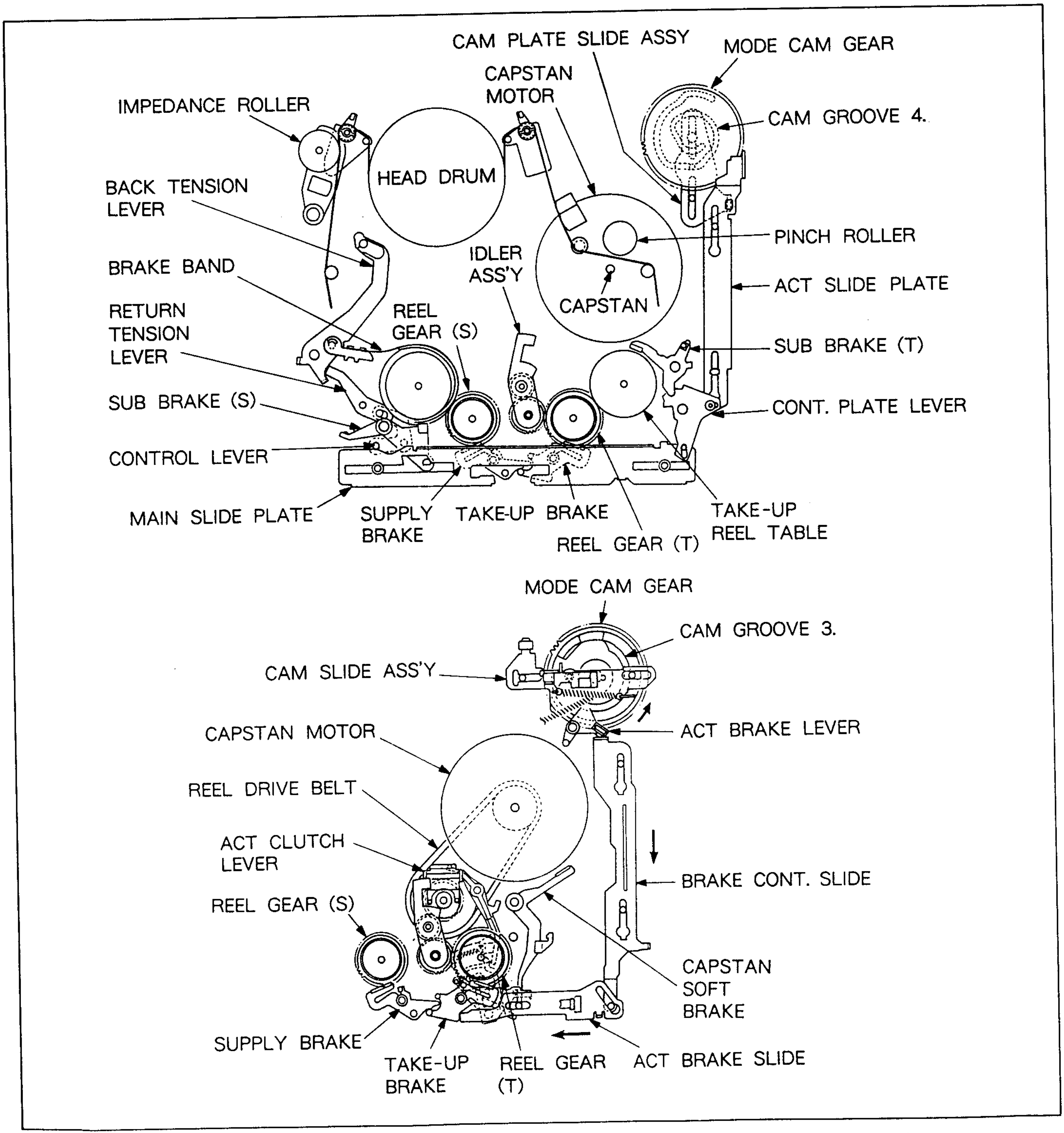

CAM PLATE SLIDE ASSY
MODE CAM GEAR
CAPSTAN MOTOR
IMPEDANCE ROLLER
CAM GROOVE 4.
HEAD DRUM
BACK TENSION LEVER
PINCH ROLLER
BRAKE BAND
IDLER ASS'Y
ACT SLIDE PLATE
CAPSTAN
RETURN TENSION LEVER
REEL GEAR (S)
SUB BRAKE (T)
SUB BRAKE (S)
CONT. PLATE LEVER
CONTROL LEVER
MAIN SLIDE PLATE
SUPPLY BRAKE
TAKE-UP BRAKE
REEL GEAR (T)
TAKE-UP REEL TABLE
MODE CAM GEAR
CAM GROOVE 3.
CAM SLIDE ASS'Y
CAPSTAN MOTOR
ACT BRAKE LEVER
REEL DRIVE BELT
ACT CLUTCH LEVER
BRAKE CONT. SLIDE
REEL GEAR (S)
CAPSTAN SOFT BRAKE
SUPPLY BRAKE
TAKE-UP BRAKE
REEL GEAR (T)
ACT BRAKE SLIDE

Fig. 2-7 CONSTRUCTION OF BRAKE CONTROL PLATE (AT REW/FF, STOP MODE)

2-2-4. Brake Control Mechanism

The mechanical logic of the brake state is shown in Fig. 2-8. The brake which damps the reel rotation is operated by the BRAKE CONTROL SLIDE driven from the CAM GROOVE 3 of the MODE CAM GEAR.

Also, to alleviate damage to the tape caused by high tension of the brake in operation, the tape is stopped after brake operation and the shape is thoughtfully designed for proper biting-in ratio of the left and the right brakes after-mentioned to each other.
This enables the supply brake to be released by the operation of the above-mentioned MAIN SLIDE PLATE after an elapse of prefixed slight time to reduce the tape tension to zero, and to provide the tape with a proper degree of looseness. As a result, a slight gap is created in the tape from the HEAD DRUM.

Further, a momentary still mechanism which dispenses with use of a plunger solenoid is not provided as one of design features of the P-90 mechanism.
To stabilize the image in an extremely short period of time during a shift to the STILL mode from the PLAY mode, the auxiliary brake (CAPSTAN SOFT BRAKE) is press-fit to the outer circumference of the capstan motor by the before-mentioned CAM GROOVE 3 of the MODE CAM GEAR.
These operations is interlocked with the operation of the before-mentioned ACT SLIDE PLATE and the MAIN SLIDE PLATE. It consists of one MODE CAM for offsetting the operating position.

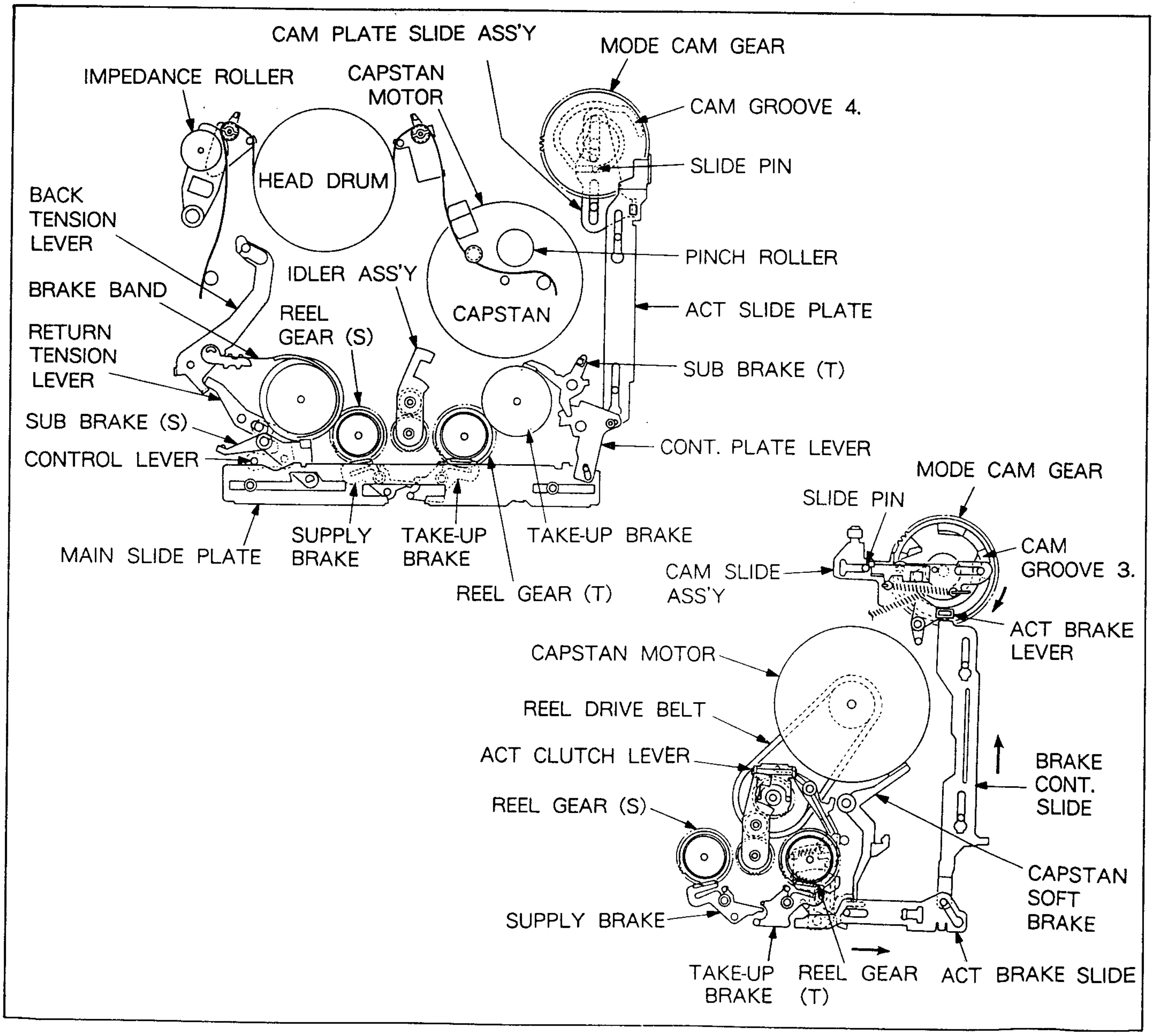
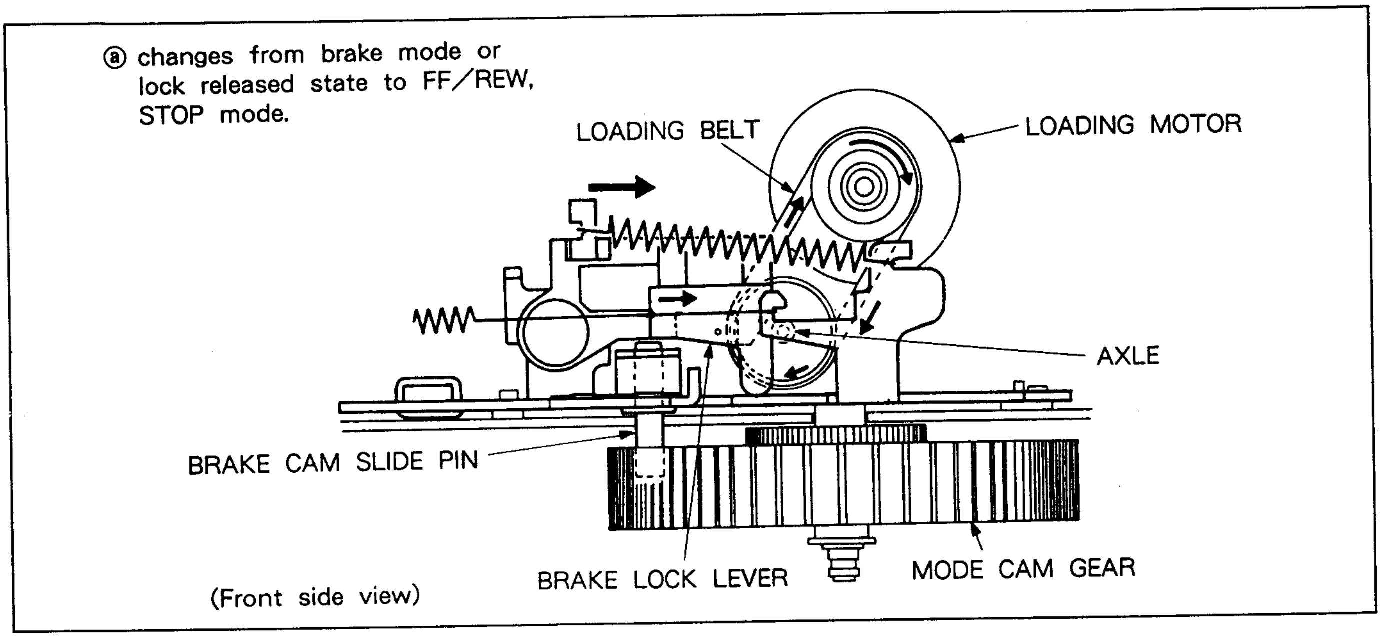

CAM PLATE SLIDE ASS'Y
MODE CAM GEAR
IMPEDANCE ROLLER
CAPSTAN MOTOR
CAM GROOVE 4.
SLIDE PIN
HEAD DRUM
BACK TENSION LEVER
PINCH ROLLER
IDLER ASS'Y
BRAKE BAND
ACT SLIDE PLATE
REEL GEAR (S)
CAPSTAN
RETURN TENSION LEVER
SUB BRAKE (T)
SUB BRAKE (S)
CONT. PLATE LEVER
CONTROL LEVER
MODE CAM GEAR
SLIDE PIN
SUPPLY BRAKE
TAKE-UP BRAKE
TAKE-UP BRAKE
MAIN SLIDE PLATE
CAM GROOVE 3.
CAM SLIDE ASS'Y
REEL GEAR (T)
ACT BRAKE LEVER
CAPSTAN MOTOR
REEL DRIVE BELT
ACT CLUTCH LEVER
BRAKE CONT. SLIDE
REEL GEAR (S)
CAPSTAN SOFT BRAKE
SUPPLY BRAKE
TAKE-UP BRAKE
REEL GEAR (T)
ACT BRAKE SLIDE

Fig. 2-8 CONSTRUCTION OF BRAKE CONTROL PLATE (AT BRAKE MODE)

2-2-5. Brake Lock Release Mechanism (FF/REW→STOP Mode)

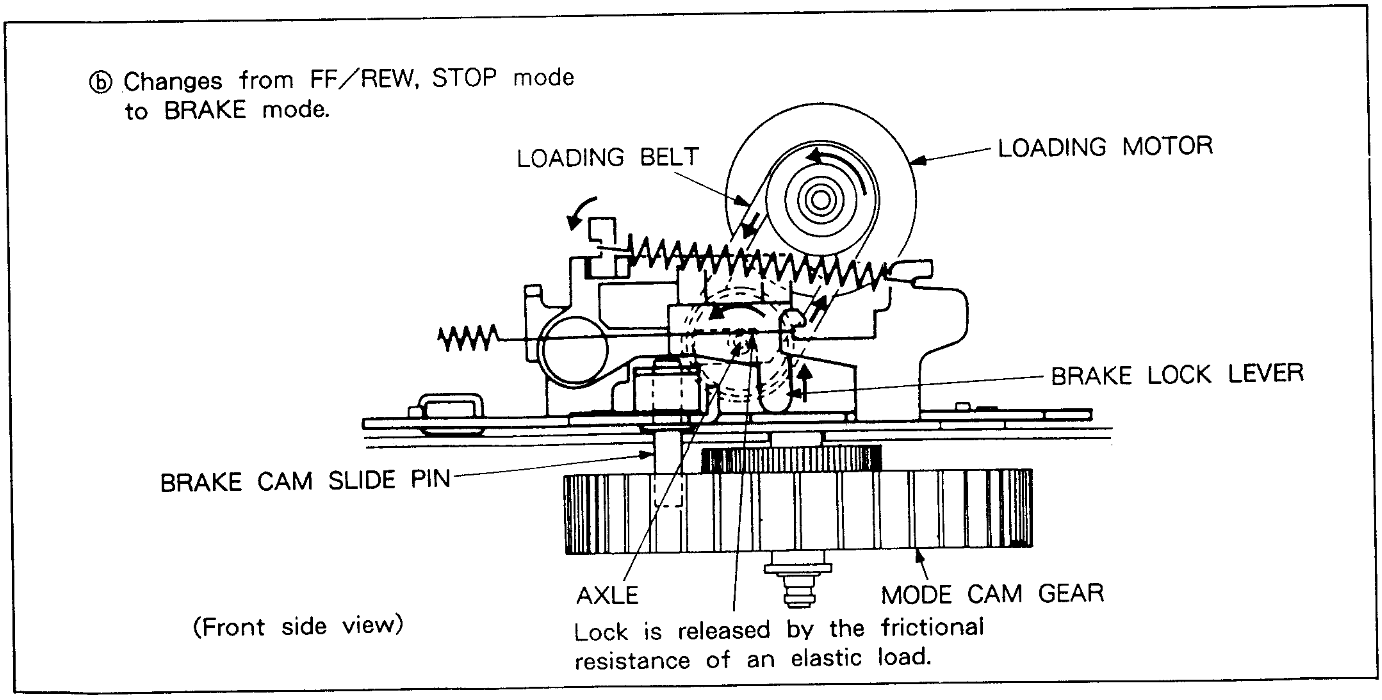
The brake lock momentary release mechanism is shown in Fig. 2-9 ⓐ, ⓑ and Fig. 2-10.
In the FF/REW mode (Fig. 2-9 ⓐ) mechanical elastic load is given to the BRAKE LOCK LEVER mounted on the BRAKE CAM SLIDE which causes the brake to operate, and it is locked to the high-speed rotary axle of the 1st reducing section of the loading motor.


ⓐ changes from brake mode or lock released state to FF/REW, STOP mode.

(Front side view)
LOADING BELT
LOADING MOTOR
AXLE
BRAKE CAM SLIDE PIN
BRAKE LOCK LEVER
MODE CAM GEAR

Fig. 2-9 ⓐ BRAKE LOCK & RELEASE MECHANISM

At the time of a shift to the STOP mode from the FF/REW (Fig. 2-9 ⓑ), the BRAKE LOCK LEVER releases the lock on slight rotation of the axle by contact between the rotary shaft and the friction resistance so that the brake can be instantaneously applied to the reel. The lock release speed is almost the same as the start-up of the loading motor. So, the its response to the brake is very quick, and construction is simplified also.


ⓑ Changes from FF/REW, STOP mode to BRAKE mode.

(Front side view)

Lock is released by the frictional resistance of an elastic load.
LOADING BELT
LOADING MOTOR
BRAKE LOCK LEVER
BRAKE CAM SLIDE PIN
AXLE
MODE CAM GEAR

Fig. 2-9 ⓑ BRAKE LOCK & RELEASE MECHANISM

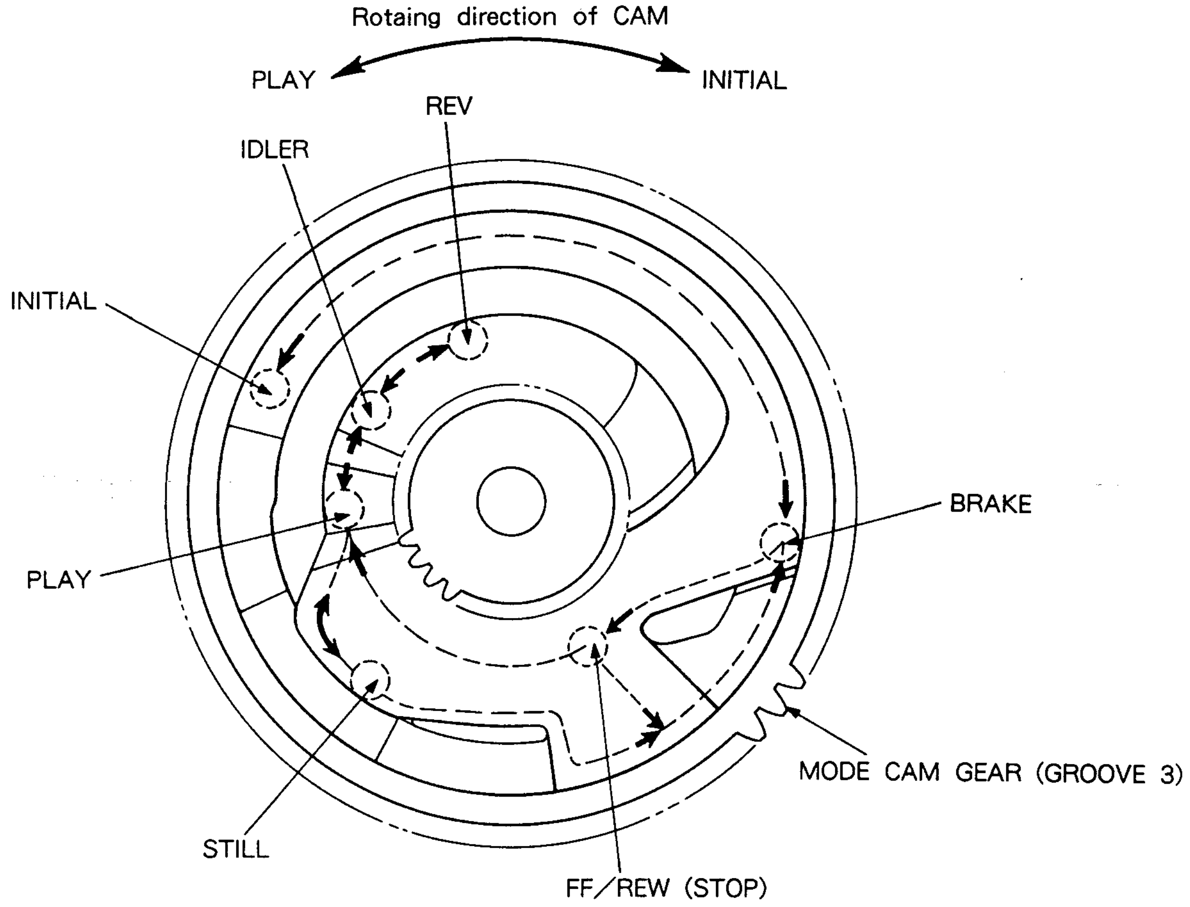

Rotaing direction of CAM
PLAY
INITIAL
REV
IDLER
INITIAL
BRAKE
PLAY
MODE CAM GEAR (GROOVE 3)
STILL
FF／REW (STOP)

Fig. 2-10 POSITIONING OF BRAKE CAM SLIDE-PIN ON THE GROOVE 3 OF MODE CAM GEAR

2-3. REEL TABLE DRIVE

2-3-1. Reel Table Drive Mechanism

This mechanism employs the system of driving the tape from the DD capstan motor via rubber belt. In the tape constant speed running mode for PLAY, F-SEARCH, and R-SEARCH, the capstan and the pinch roller are press-fitted to allow the tape to run at a constant speed. By providing a FRICTION MECHANISM in between the capstan motor and the reel table, the tape is taken up. In the FF/REW tape high-speed take-up mode, the capstan and the pinch roller are separated from each other, and the capstan motor and the reel table are linked direct by the clutch mechanism to carry out tape take-up. Also, to realize a thin type reel table drive section, the mechanism is simplified and the rotary parts are thinned for realization of physically compact design, and a step is provided on the reel table mounting section of the chassis by high-precision drawing process. A simplified figure of the drive mechanism is shown in Fig. 2-11 and Fig. 2-12. Power transmission to the pulley of the clutch mechanism section is done from the DD capstan motor via rubber belt.

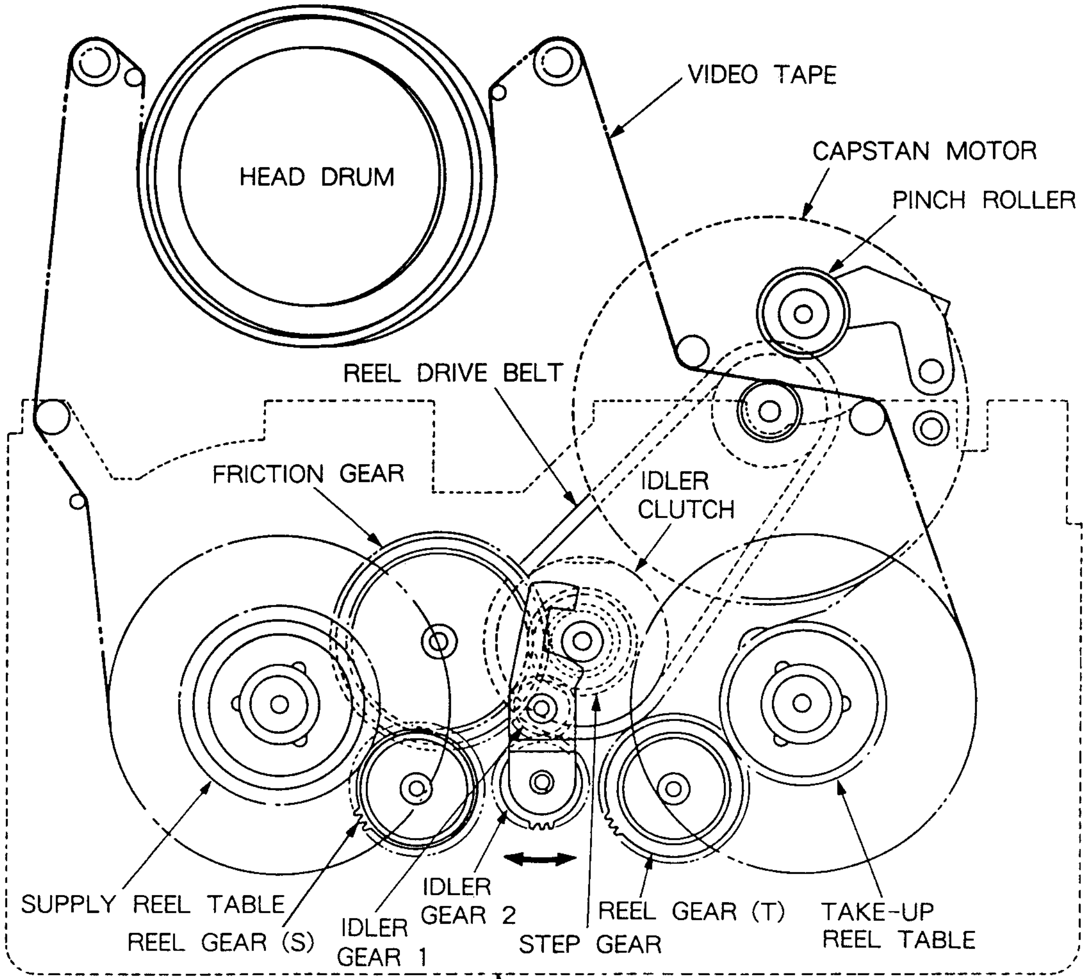

VIDEO TAPE
CAPSTAN MOTOR
PINCH ROLLER
HEAD DRUM
REEL DRIVE BELT
FRICTION GEAR
IDLER CLUTCH
SUPPLY REEL TABLE
REEL GEAR (S)
IDLER GEAR 1
IDLER GEAR 2
STEP GEAR
REEL GEAR (T)
TAKE-UP REEL TABLE
VIDEO CASSETTE

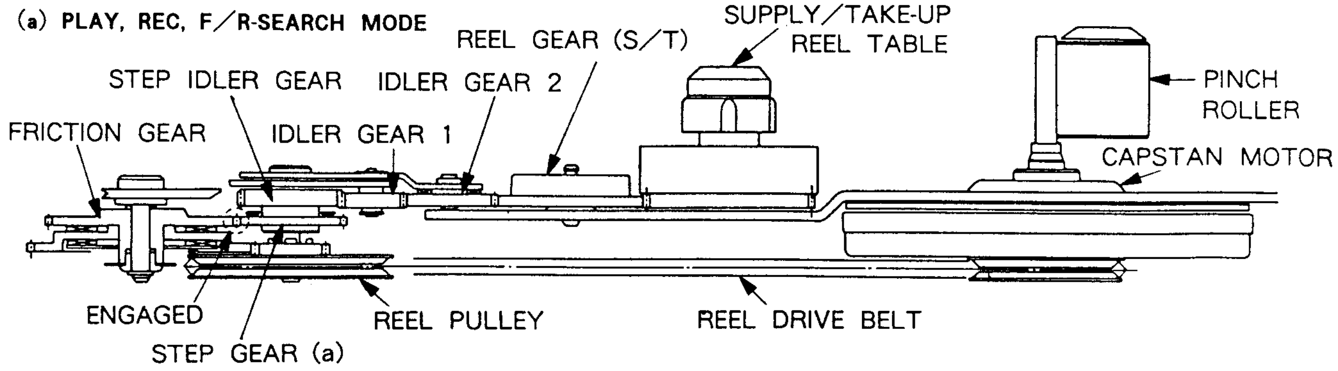
Fig. 2-11 REEL TABLE DRIVE

At that time, the reel table winding speed and the torque needed in a wide variety of modes are obtained by shifting the up and down STEP GEAR positioned at the upper section of pulley. The selection of the STEP GEAR is precision controlled by the MODE CAM GEAR via the BRAKE CONTROL SLIDE. With the up and down STEP GEAR down, the clutch mechanism is direct linked, and the transmission power from the capstan motor is sent to the reel table via IDLER GEAR assembly and REEL GEAR (S/T). On the other hand, FRICTION MECHANISM acts between the pulley and the STEP GEAR when the up and down STEP GEAR are in the elevated state, thereby controlling the transmission torque for generation of the take-up slip. Normally, it is desirable that the take-up torque of the reel table is higher in the R-SEARCH mode than that in the PLAY mode. This is because in the forward tape running the tape winding load to the HEAD DRUM has to be taken care of the capstan and the pinch roller.
While, in the reverse tape running mode the winding load has to be taken on the take-up reel table. In the special playback operation, a mechanism for varying the take-up torque of the reel table is required to be changed depending upon the running direction of the tape. But in this mechanism, the torque selection is made by varying the reduction speed ratio up to the reel table from the capstan motor on both the forward side and the reverse side of the tape. Also, design simplification of the selection mechanism is realized by using a single friction mechanism. In other words, the take-up torque necessary for forward/reverse rotation is obtained by controlling the capstan motor speed.

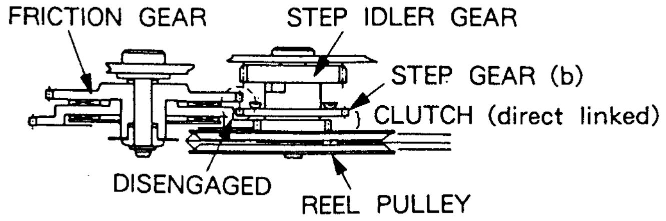
Rotation speed and torque needed for each mode of operation are converted by clutch mechanism for transmission of the drive power to the idler mechanism. The left and right moving IDLER GEAR assembly is automatically rotated to the left and the right according to the direction of capstan motor rotation by using the friction force. Because the mechanism is so designed as to drive the reel table of the side on which the tape is transported by the capstan and pinch roller, the forward and reverse constant speed drive (the PLAY, REC, F/R SEARCH modes) is carried out in the state in which the FRICTION MECHANISM is being operated (Fig. 2-12 ⓐ) On the other hand, in the condition in which the friction mechanism is not in operation, the forward/reverse high speed drive (FF/REW mode) is made possible (Fig. 2-12 ⓑ). Also, the reel drive in all modes is taken care of by the single left and right moving idler for design simplification.

The idler body employs gear drive to improve reliability with a view to realizing parts thinning while securing the transmission reliability. Using a resin molded gear as material of an idler, the efficiency of the entire reel drive system has been improved because there are no deformation and loss, and minimized rotation moving torque necessary for biting-in as in the case of a material such as rubber which shows considerable elastic deformation, etc. Further in this mechanism, an intermediate gear is provided in between the reel side and the idler to minimize the rotating and moving angle of the left and right moving idlers, thereby holding the reversing time to a minimum when shifting to the tape running direction change mode. This results in significantly reduced possibility of tape looseness.

(a) PLAY, REC, F/R-SEARCH MODE



(b) F-FWD/REW, STOP MODE



(a) The clutch mechanism is disengaged, and rorational force is transmitted through the friction mechanism. (Constant speed rotating mode)

(b) Direct transmission is obtained by disengaging the friction mechanism with a clutch mechanism. (High-speed rotating mode)

Fig. 2-12 REEL TABLE DRIVE (SIDE VIEW)

2-3-2. Reel Table Drive Clutch Lock and Release Mechanism

As described in the preceding section, using the selection of the step gear (CLUTCH MECHANISM), two mechanisms which are driven by being selected via direct drive or via FRICTION MECHANISM from the capstan motor, to execute the reel table drive. The operating status of the clutch lock and the releasing mechanism is shown in Fig. 2-13.

Fig. 2-13 ① shows the tape unloading position (INITIAL position) when the power for the mechanism operating mode is switched off.

At that times all the levers are in the initial positions, and the clutch is released also so that a route for reel table drive is created via a friction mechanism.

Fig. 2-13 ② shows that the mechanism operation mode has executed the tape loading and that it has completed its movement to the STOP (stand-by), FF/REW position.

At this time, the CLUTCH ACT LEVER is operated by the hook of the ACT BRAKE SLIDE to move the ACT CLUTCH LEVER in the direction of arrow via the CLUTCH LEVER and the CLUTCH CHANGE LEVER. Now, the up and down STEP GEAR is placed into the direct coupled state. In the FF/REW mode, the reel table is directly driven so that the rotation of the capstan motor is directly transmitted to make high-speed rotation drive possible. When shifting the mode to the STOP from the FF/REW in this condition, the mechanism mode position is once moved back to the brake position, and when the reel table brake is instantaneously applied, the clutch is released once at the same time, after which it returns to the same mechanism mode as the FF/REW mode once again. Now, it is placed in a waiting state in the same condition of the STOP mode as shown in Fig. 2-13 ②.

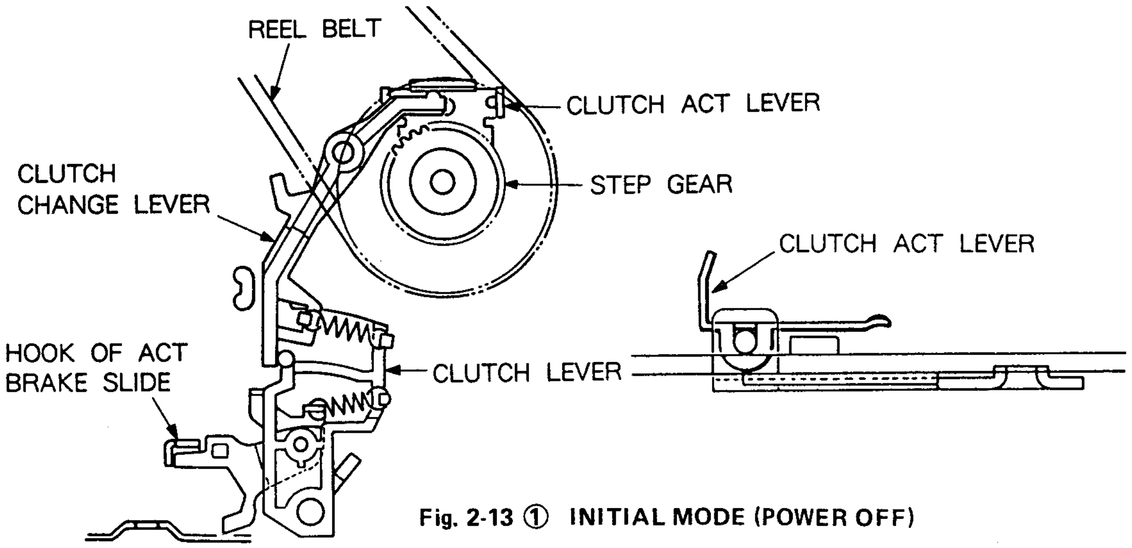

REEL BELT
CLUTCH ACT LEVER
CLUTCH CHANGE LEVER
STEP GEAR
CLUTCH ACT LEVER
HOOK OF ACT BRAKE SLIDE
CLUTCH LEVER

Fig. 2-13 ① INITIAL MODE (POWER OFF)

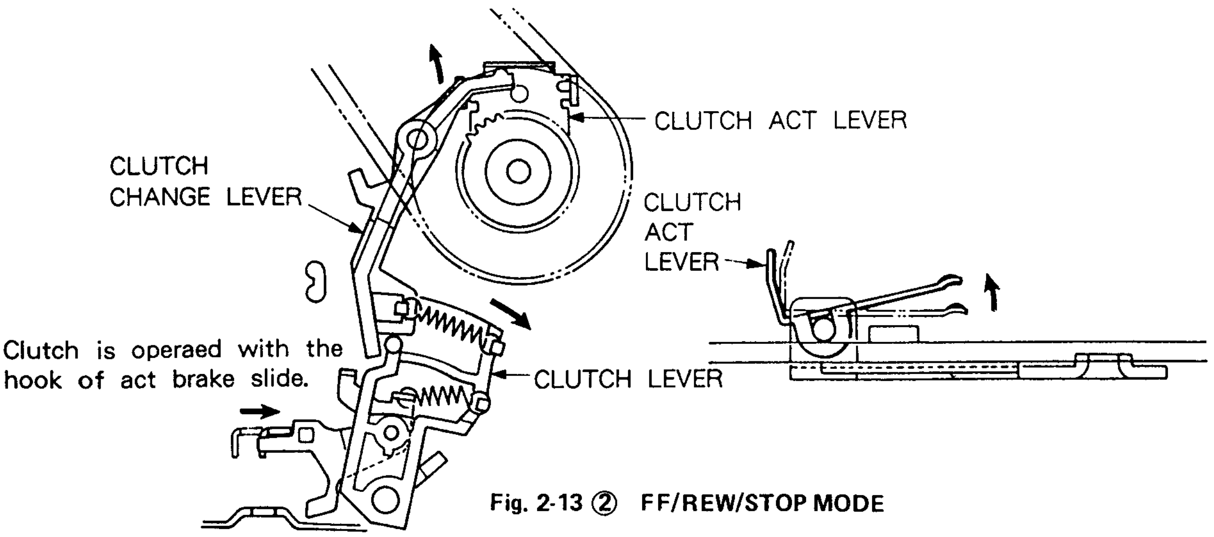

CLUTCH ACT LEVER
CLUTCH CHANGE LEVER
CLUTCH ACT LEVER
Clutch is operaed with the hook of act brake slide.
CLUTCH LEVER

Fig. 2-13 ② FF/REW/STOP MODE

Fig. 2-13 ① – ③ REEL TABLE DRIVE CLUTCH LOCK AND RELEASE MECHANISM

Fig. 2-13 ③ shows the completion state of a shift to the PLAY mode via the STILL mode from the STOP (FF/REW) mode for the mechanism mode position.

In the case of this mode shifting, the movement of the BRAKE ACT SLIDE remains fixed. So, the CLUTCH ACT LEVER should be unlocked by the movement of the hook of the MAIN SLIDE PLATE to cause the clutch to be released. This movement in turn causes the capstan motor rotation to be transmitted via the friction mechanism. So, the constant speed rotation drive necessary for the PLAY (REC) mode and SEARCH mode is made possible.

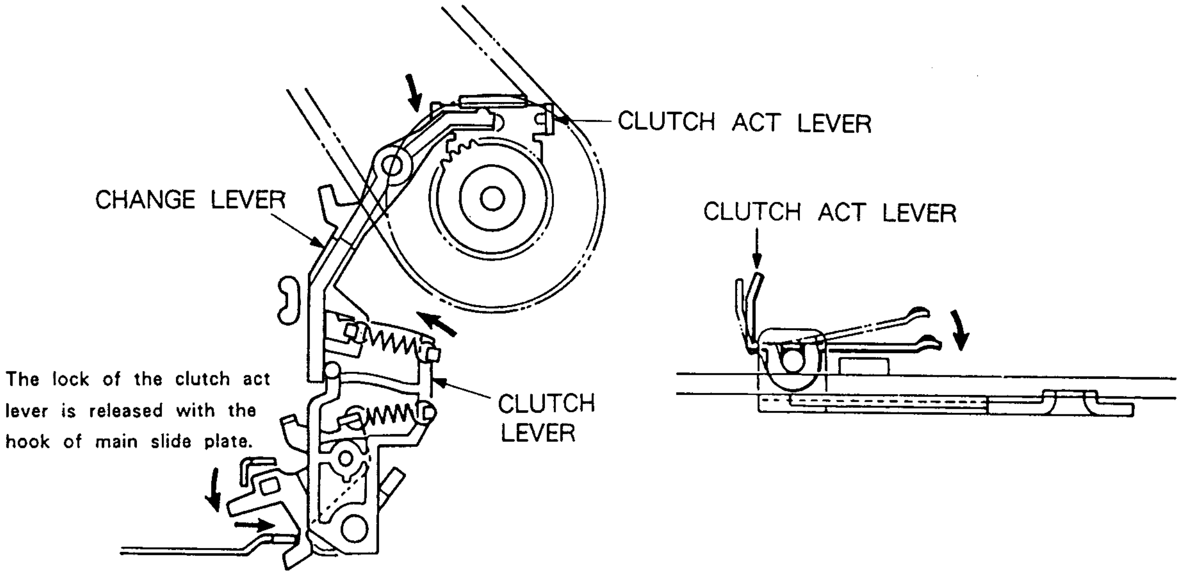

CLUTCH ACT LEVER
CHANGE LEVER
CLUTCH ACT LEVER
The lock of the clutch act lever is released with the hook of main slide plate.
CLUTCH LEVER

Fig. 2-13 ③ FF/REW/STOP MODE → STILL MODE → PLAY MODE

2-4. FRONT LOADING DRIVE SELECTION MECHANISM

In the P-90 mechanism, the motor dedicated to the use of front loading is not employed. The drive source is utilized instead of the tape loading motor. As shown in Fig. 2-14 ⓐ/ⓑ, during the front loading the FRONT LOAD WORM GEAR directly coupled to the tape loading motor axle and the FRONT HELICAL GEAR with several teeth missing are engaged with each other and rotated for transmission of the drive force to the front loading mechanism. When the cassette tape is inserted completely in the mechanism, the FRONT HELICAL GEAR is automatically disengaged from the FRONT LOAD WORM GEAR. After that, the tape loading operation is performed without the tape loading motor drive force being transmitted to the front loading mechanism.

While the drive force is being transmitted to the front loading mechanism, the CAM GROOVEs of the before-mentioned MAIN CAM GEAR and the MODE CAM GEAR are flat in cam line pattern. These are therefore held without changing the mode state of the mechanism in any way.

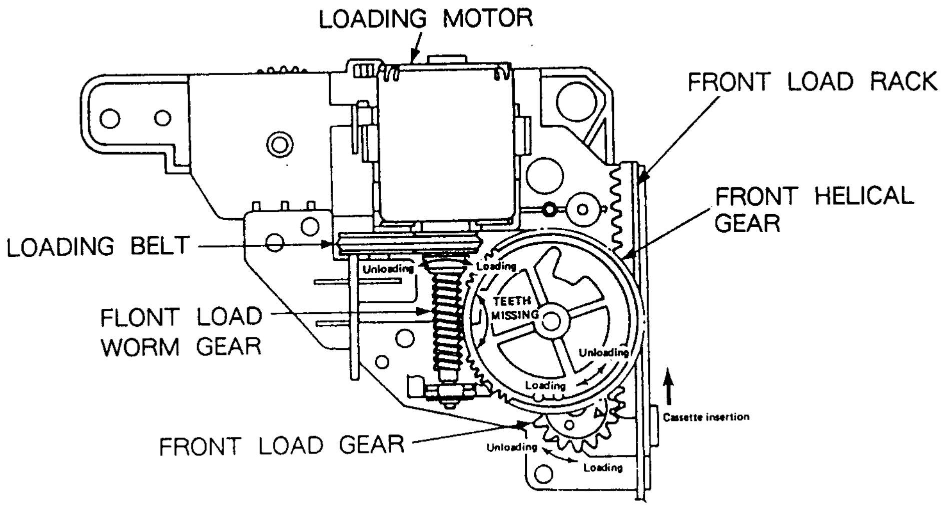

LOADING MOTOR
FRONT LOAD RACK
FRONT HELICAL GEAR
LOADING BELT
FLONT LOAD WORM GEAR
Unloading
Loading
TEETH MISSING
Unloading
Loading
Cassette insertion
FRONT LOAD GEAR
Unloading
Loading

Fig. 2-14 ⓐ FRONT LOADING DRIVE SELECTION MECHANISM (CASSETTE INSERTED POSITION)

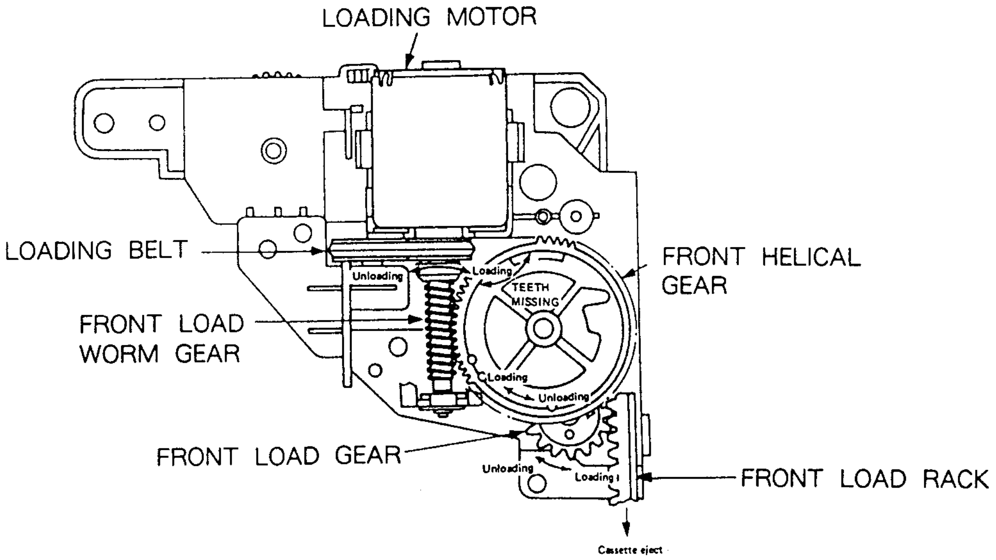

LOADING MOTOR
LOADING BELT
FRONT HELICAL GEAR
Unloading
Loading
TEETH MISSING
FRONT LOAD WORM GEAR
Loading
Unloading
FRONT LOAD GEAR
Unloading
Loading
FRONT LOAD RACK
Cassette eject

Fig. 2-14 ⓑ FRONT LOADING DRIVE SELECTION MECHANISM (CASSETTE EJECTED POSITION)

(A) Cassette inserting operation
When inserting a cassette from the cassette ejected state of Fig. 2-14 ⓑ, the FL START SWITCH shown in Fig. 2-15 is turned OFF, to cause the loading motor to be rotated in the direction of insetting. As a result, the FRONT LOAD RACK is drawn in, and the front loading is made up to the cassette tape completion point. So, it is locked in the grooves shown in Fig. 2-15 to complete cassette inserting. At that time, the FRONT HELICAL GEAR is positioned at ⓐ of Fig. 2-14, and is released from the front loading mechanism, therefore, the tape loading operation is continuously performed.

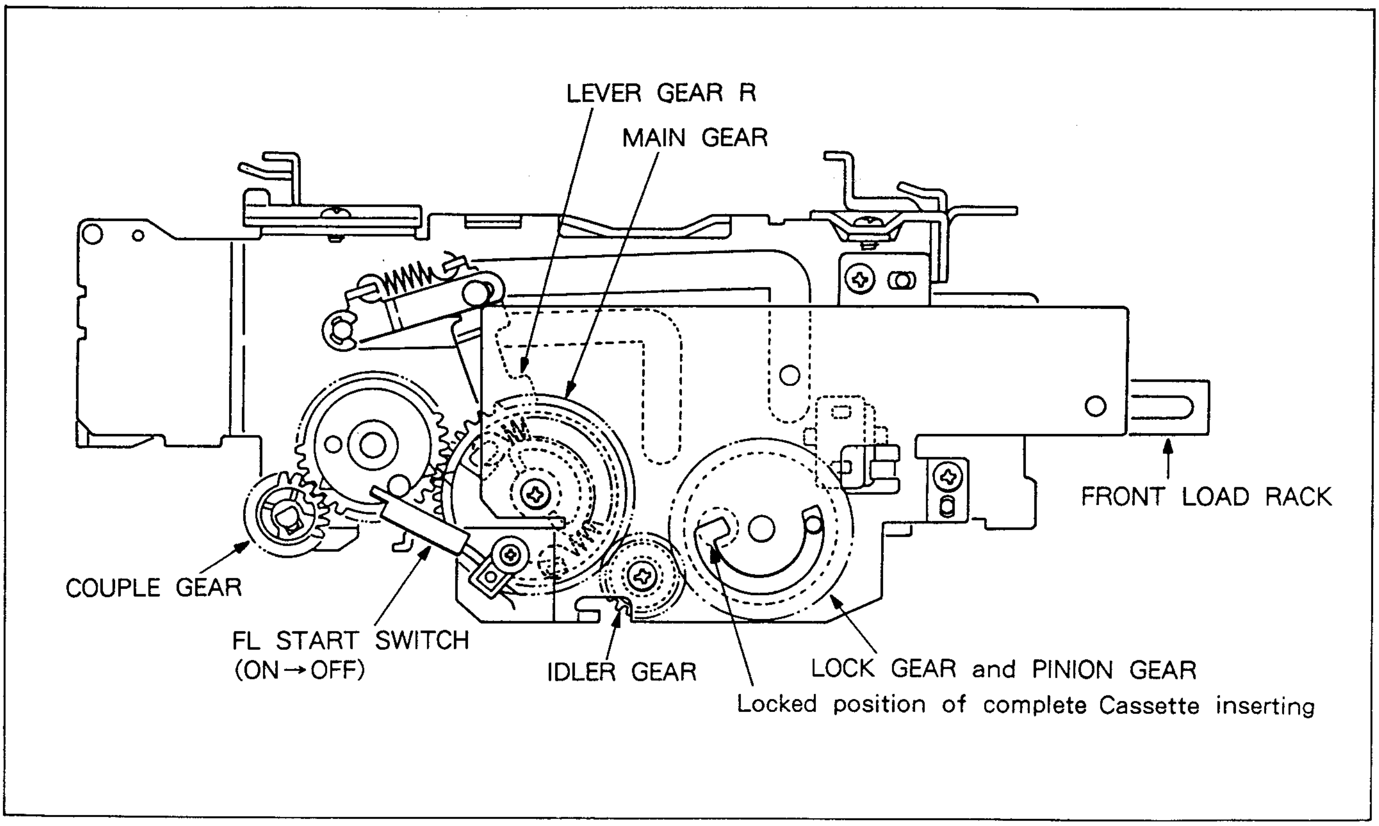

LEVER GEAR R
MAIN GEAR
FRONT LOAD RACK
COUPLE GEAR
FL START SWITCH
(ON→OFF)
IDLER GEAR
LOCK GEAR and PINION GEAR
Locked position of complete Cassette inserting

Fig. 2-15 CASSETTE HOLDER MECHANISM (CASSETTE INSERTING OPERATION)

(B) Cassette ejection operation

The components of the front loading mechanism is shown in Fig. 2-16.

When ejecting the cassette from the inserted state shown in Fig. 2-14 ⓐ, the FRONT ACT LEVER is pushed in the direction of arrow due to the ACT SLIDE PLATE moves in the direction of arrow shown in Fig. 2-17. As a result, the FRONT LEVER assembly is turned counterclockwise via the FRONT LOAD SLIDE to cause the FRONT HELICAL GEAR to be engaged with the FRONT LOAD WORM GEAR of the loading motor. At that time, the loading motor is being rotated counterclockwise, so that the FRONT HELICAL GEAR is caused to be rotated counterclockwise also to carry out the front unloading via the FRONT LOAD GEAR and the FRONT LOAD RACK. At the same time, the FRONT ACT LEVER is operated counterclockwise by the hook of the FRONT HELICAL GEAR. This releases the lock being pushed in the direction of arrow indicated by the ACT SLIDE PLATE. So, the FRONT LOAD SLIDE assembly now moves to the initial position to prepare for the next ejection operation. Incidentally, the movement of the FRONT LEVER assembly performs an important function of positioning the FRONT HELICAL GEAR (Fig. 2-14 ⓐ) upon completion of cassette mounting, in addition to the cassette eject start-up operation.

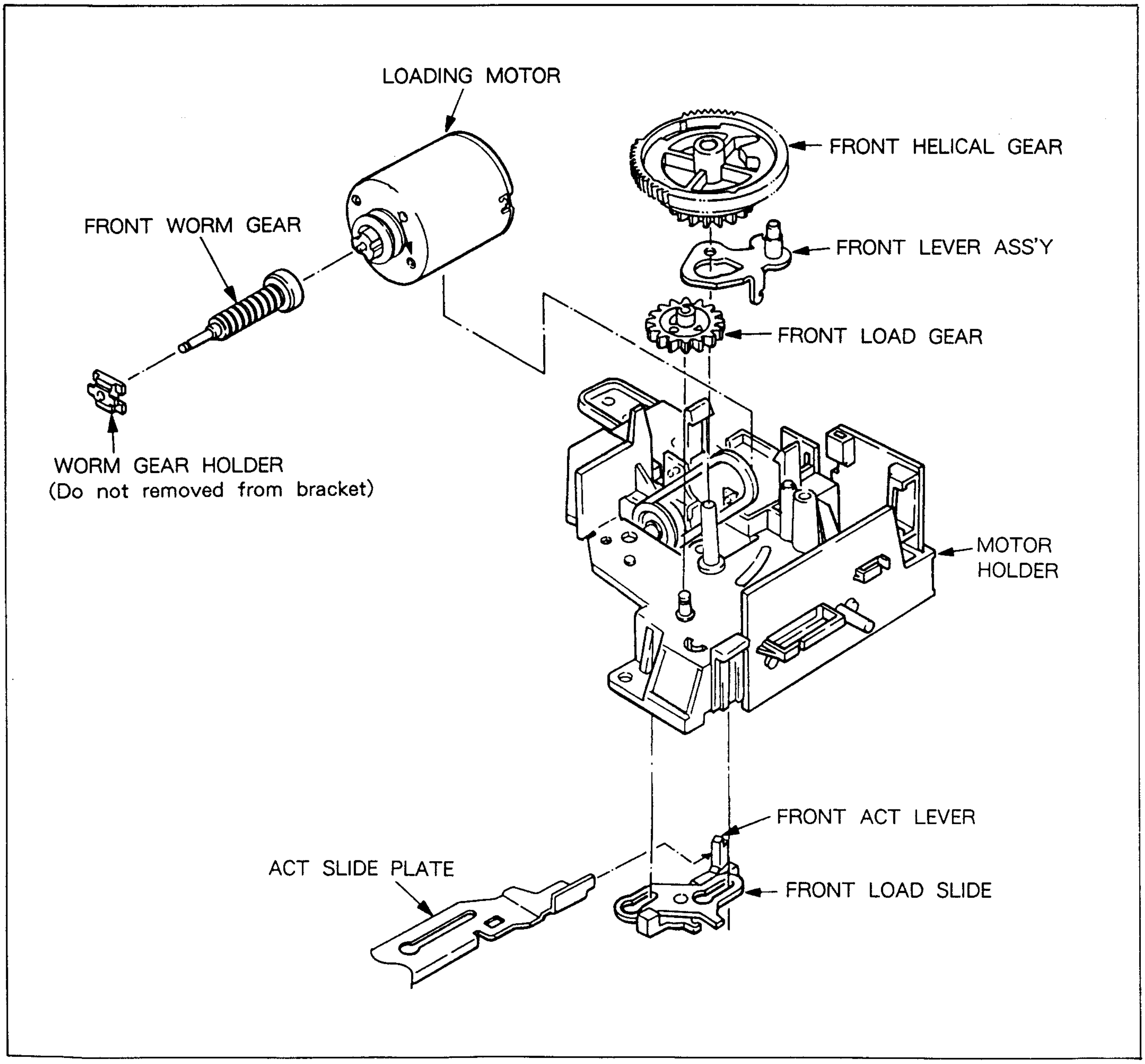
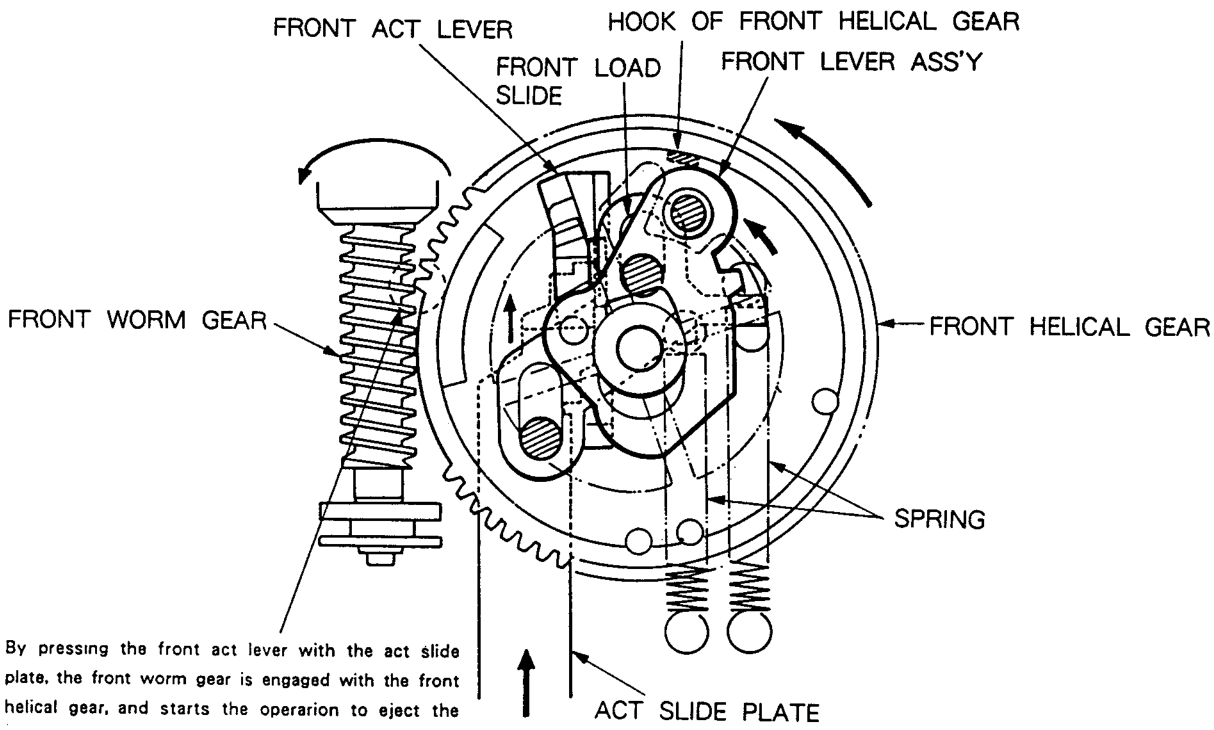

LOADING MOTOR
FRONT HELICAL GEAR
FRONT WORM GEAR
FRONT LEVER ASS'Y
FRONT LOAD GEAR
WORM GEAR HOLDER
(Do not removed from bracket)
MOTOR
HOLDER
FRONT ACT LEVER
ACT SLIDE PLATE
FRONT LOAD SLIDE

Fig. 2-16 FRONT LOADING DRIVE SELECTION MECHANISM


FRONT ACT LEVER
HOOK OF FRONT HELICAL GEAR
FRONT LOAD SLIDE
FRONT LEVER ASS'Y
FRONT WORM GEAR
FRONT HELICAL GEAR
SPRING
ACT SLIDE PLATE

By pressing the front act lever with the act slide plate, the front worm gear is engaged with the front helical gear, and starts the operarion to eject the cassette.

Fig. 2-17 CASSETTE EJECTION START OPERATION (See through top view)

2-5. CASSETTE HOLDER MECHANISM

2-5-1. Components

The exploded view of the cassette holder mechanism is shown in Fig. 2-18. This mechanism consists of a cassette tray for feeding the cassette tape to the specified position of the mechanism chassis, a side plate provided with L type holes for supporting and guiding it, the top plate for regulating the width of left and right, and a group of gears for driving the cassette tray.
The entire mechanism is of independent construction apart from the mechanism body. The holder is fixed on the mechanism chassis by inserting the pawls at two points and tightening the setscrews at two points, or at a total of four points.

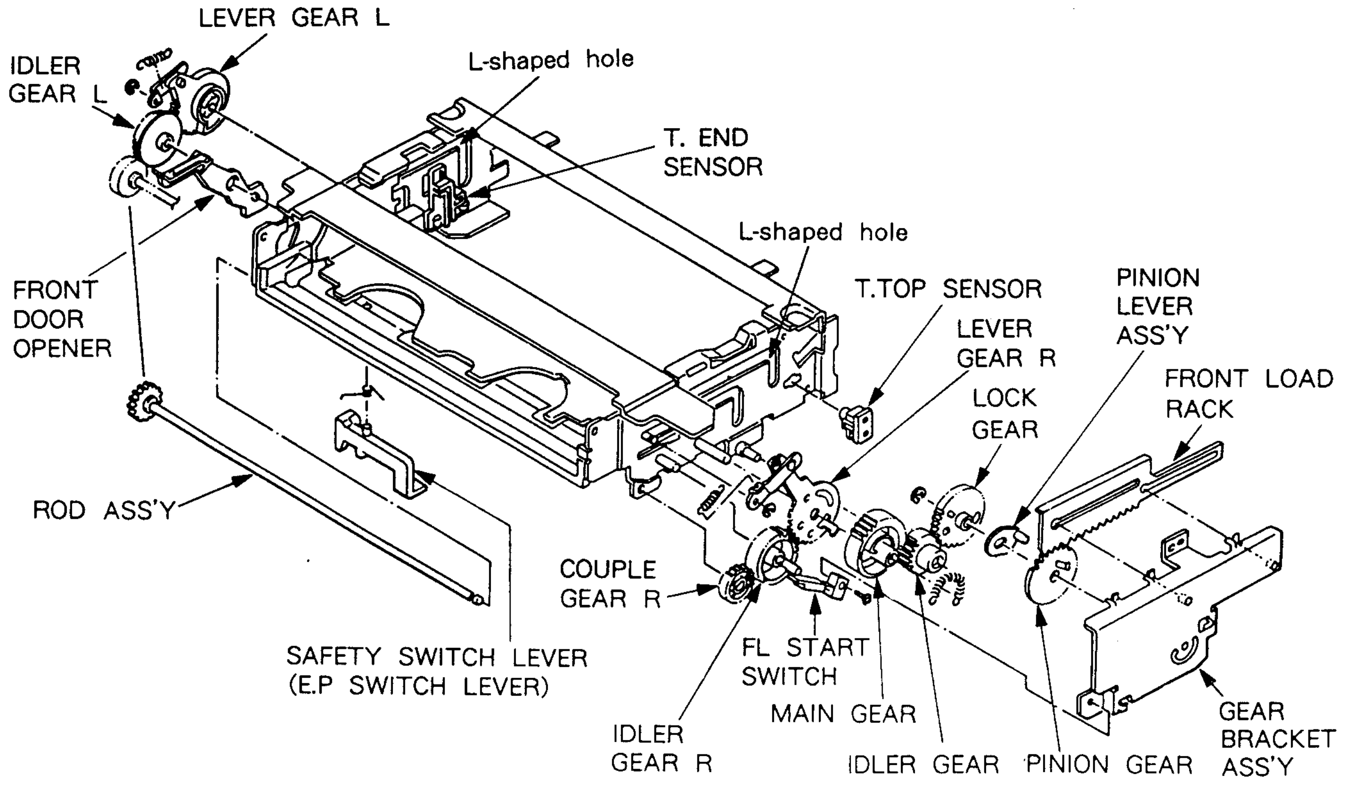

LEVER GEAR L
IDLER GEAR L
L-shaped hole
T. END SENSOR
L-shaped hole
T.TOP SENSOR
PINION LEVER ASS'Y
LEVER GEAR R
FRONT LOAD RACK
LOCK GEAR
FRONT DOOR OPENER
ROD ASS'Y
COUPLE GEAR R
SAFETY SWITCH LEVER (E.P SWITCH LEVER)
FL START SWITCH
MAIN GEAR
IDLER GEAR R
IDLER GEAR
PINION GEAR
GEAR BRACKET ASS'Y

Fig. 2-18 EXPLODED VIEW OF THE CASSETTE HOLDER MECHANISM

2-5-2. Description of Cassette Holder

The cassette holder is of motor-less design, as the lowering of mechanism height and driving source are done by the loading motor of the mechanism body.

As a substitute for the worm gear system hitherto used in the major drive section for the drive selection mechanism mentioned in section 2-4., the RACK LOADING system is adopted in this cassette holder mechanism. By this mechanism the motor-less design can be realized. An exploded view of the mechanism is shown in Fig. 2-19. A description of the operation is made below along with Fig. 2-19. To press-fit the cassette tape after sending it onto the mechanism chassis, the PINION GEAR section is triple construction. The FRONT LOAD RACK side and the IDLER GEAR side are independently engaged. The PINION GEAR and the LOCK GEAR are connected from the PINION LEVER PIN riveted to the PINION LEVER. Even after feeding the cassette tape to the specified position of the mechanism chassis, the FRONT LOAD RACK slides, giving the rotation to the PINION GEAR which is engaged with the FRONT LOAD RACK. At that time, a pin is dropped into the groove section provided on the GEAR BRACKET ASS'Y.

The other LOCK GEAR is fixed by this PINION LEVER PIN, and the cassette tape is press-fitted onto the mechanism chassis by linked IDLER GEAR. The before-mentioned FRONT LOAD RACK and the PINION GEAR are set free after dropping the PINION LEVER PIN into the groove section. So, the drive force of the loading motor is sent to the mechanism body.

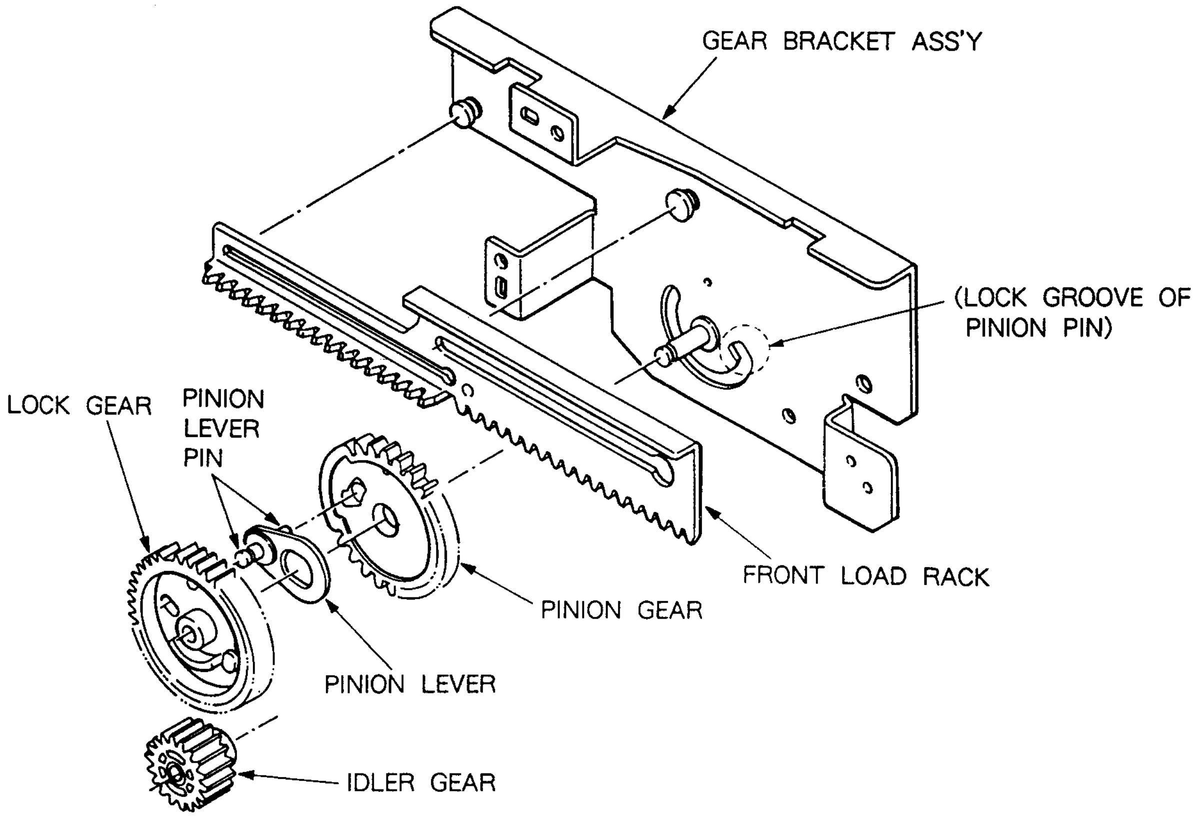


Fig. 2-19 RACK LOADING MECHANISM OF CASSETTE HOLDER

3. MECHANISM CONTROL

3-1. MODE ARRANGEMENT

This mechanism is arranged in such a mode layout as shown in Table. 3-1 and as described in section 2-1. The mode sensing switch described below is used for control of these modes.

3-2. MODE DETECTION SWITCH

For mode detecting one leaf switch (FL START SWITCH and one rotary switch (MECHANISM MODE SWITCH) are used in combination.

Mechanism Mode	Mechanism Mode Switch			HEX DATA	Function	Main Mode Shifting Conditions	VTR Operation Mode
	3	2	1				
EJECT	–	–	–		Eject position		EJECT
					↑ Front loading/Unloading ↓		
SHORT REW	–	–	–		Take up operation in the tape end position		Low side of ⑥. Sensed upon IN
INITIAL	1	1	1	⑦	Power off position		Power off when tape is loaded completely
					Tape unloading position ↑ Tape loading ↓ Tape loading ending position		
BRAKE	0	0	1	①	Main brake applying position		
STOP / FF/REW	0	1	0	②	STOP waiting and FF/REW (the head motor rotation)		STOP, FF/REW
STILL	0	1	1	③	The positions of STILL, SLOW or F-ADV.		STILL, SLOW, F-ADV
PLAY	1	0	0	④	From FWD direction Normal running mode		PLAY, REC, F-SEARCH
IDLER	1	0	1	⑤	Forward/reverse changeover position		PAUSE
REV	1	1	0	⑥	From REV direction Normal running mode		R-SEARCH

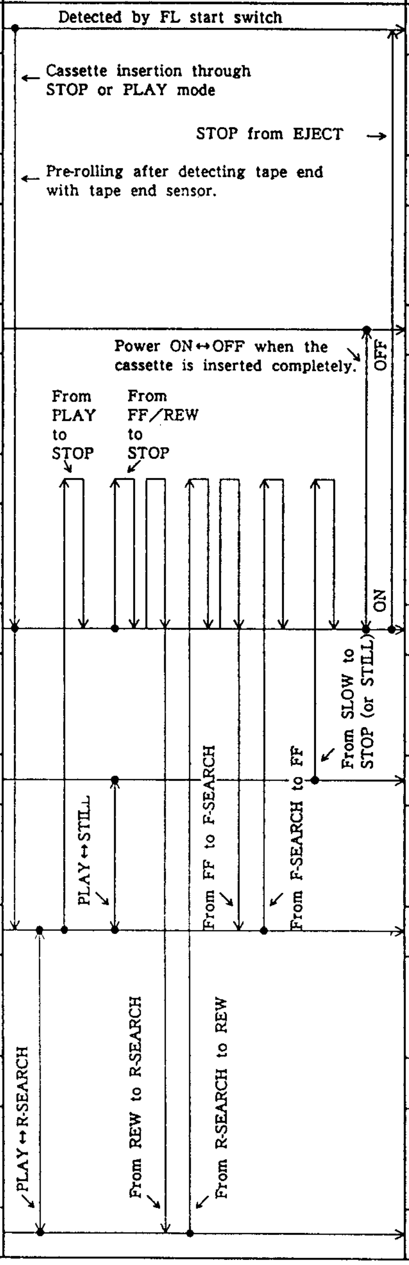

Detected by FL start switch
Cassette insertion through STOP or PLAY mode
STOP from EJECT
Pre-rolling after detecting tape end with tape end sensor.
Power ON↔OFF when the cassette is inserted completely.
OFF
ON
From PLAY to STOP
From FF/REW to STOP
From SLOW to STOP (or STILL)
PLAY↔STILL
From FF to F-SEARCH
From F-SEARCH to FF
PLAY↔R-SEARCH
From REW to R-SEARCH
From R-SEARCH to REW

Table 3-1

(1) Switch component

The mode switch consists of FL START SWITCH for detecting the cassette ejection and insertion, and MECHANISM MODE SWITCH for detecting the each mode position of the mechanism. As can be understood from Fig. 3-1, the MECHANISM MODE SWITCH rotates in excess of 360 degrees. Therefore, the sensing of a signal from the MECHANISM MODE SWITCH is done by the leaf switch.

In the P88 and P89 mechanisms, incidentally, short REW position is detected by the FL END SW, but in the P90 mechanism, the FL END SWITCH is not required due to a change in the internal structure of the MECHANISM MODE SWITCH.

(2) Mechanism mode switch

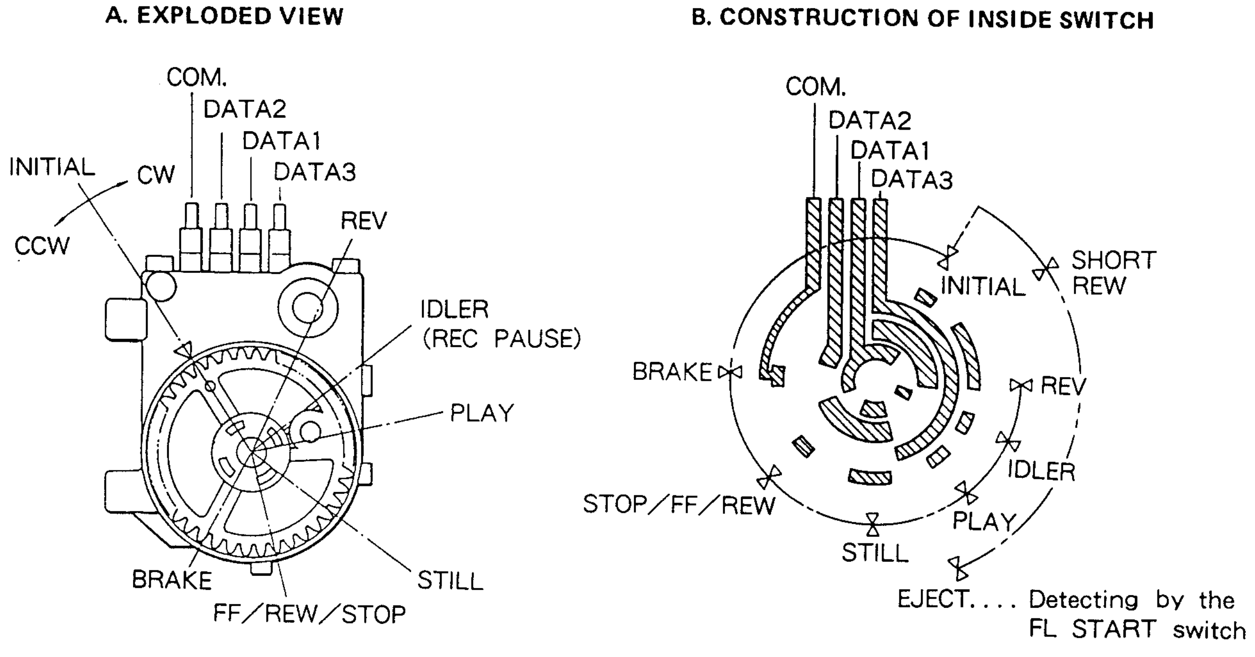
The mechanism mode switch consists of four terminals, namely, COM, DATA1, DATA2, and DATA3. These are processed as 3-bit signals for discrimination of seven modes.

The MECHANISM MODE SWITCH is not interchangeable with the hither to available black switch due to a change in its internal structure. Be sure therefore to use a blue switch.

3-3. CONSIDERATION TO FULL LOADING

① In the normal stop condition, the head drum is rotated to facilitate the start-up of the image at the time of playback, but it is conceivable that this is left undisturbed for an extended period of time. This may result in wear of the video head. For this reason, when five minutes elapse from the stop condition, the head drum stops rotating.

② To prevent the tape from being caught in the head drum due to dew forming, etc., the tape is housed in the unloaded cassette when turning the power off.



A. EXPLODED VIEW

B. CONSTRUCTION OF INSIDE SWITCH

COM.
DATA2
DATA1
DATA3
INITIAL
CW
CCW
REV
IDLER
(REC PAUSE)
PLAY
BRAKE
STILL
FF/REW/STOP
COM.
DATA2
DATA1
DATA3
SHORT REW
INITIAL
BRAKE
REV
IDLER
STOP/FF/REW
PLAY
STILL
EJECT. . . . Detecting by the FL START switch

Fig. 3-1 MECHANISM MODE SWITCH (ROTARY SWITCH)

4. MECHANISM MAINTENANCE AND CHECKING

4-1. PERIODIC CHECKING AND MAINTENANCE ITEMS AND SERVICE JIGS

The following maintenance and periodic checking procedures are recommended to ensure proper operation, and to protect the tape from dirt and damage. Also, these procedures should always be followed after repairing the unit.

4-1-1. Periodic Check Items

○ Cleaning ◎ Confirmation △ Lubrication

Part	Usage Time (hours)	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	Remarks
Tape Guide System	Tape running surfaces	○	○	○	○	○	○	○	○	○	○	
	ACE head	○	○	○	○	○	○	○	○	○	○	
	Drum (cylinder)	○	○	○	○	○	○	○	○	○	○	Head life depends heavily on operating conditions.
Drive System	Loading belt	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Reel drive belt	◎	◎	◎	◎	◎	◎	◎	◎	◎	◎	
	Intermediate gear, pulley axles		△		△		△		△		△	Absolutely avoid oil on tape running surfaces.
	Capstan axles		△		△		△		△		△	
	Loading motor		◎		◎		◎		◎		◎	
Performance Check	Back tension torque		◎		◎		◎		◎		◎	50 ± 10 gcm
	Brake system		◎		◎		◎		◎		◎	
	FF, REV, PLAY torque		◎		◎		◎		◎		◎	FF : 600 gcm and over REW:750 gcm and over REV : 150 to 240 gcm PLAY : 100 to 160 gcm

Note : The back tension torque is the value that has been measured by the cassette torque meter (VHJ-0016).
The torque of FF, REV, REW, and PLAY represent those measured with them locked by the torque gauge.
FF and REW are values 2 seconds after starting.

4-1-2. Cleaning

① Drum (COMPL CYLINDER) and Video Heads (See Fig. 4-1-1.)

1) Wrap a chamois leather around your finger and moisten it with methyl alcohol.
2) Move the chamois leather to left and right several times on the video head to clean. There is a video head also on the opposite side, so clean it likewise. In Hi-Fi models, clean the audio head also.
3) Clean the tape path surface of the cylinder in the same way.

Note : Always turn power off before cleaning. Do never move the chamois leather vertically or apply too much force to the head ; it may be damaged.

② Cleaning of the Tape Guide System (See Fig. 4-1-2.)

1) Set the EJECT mode and clean the tape guide system (tape guides, impedance roller, FTE head, ACE head, pinch rollers, capstan axles, etc.) with a chamois leather moistened with methyl alcohol.

Note : Make sure that no oil, grease, etc. adhere to the chamois leather and that heads are not damaged.

③ Cleaning of the Drive System

1) Clean the drive system (loading belt, reel drive belt, pulley, supply reel table, etc.) with a soft cloth moistened with methyl alcohol.

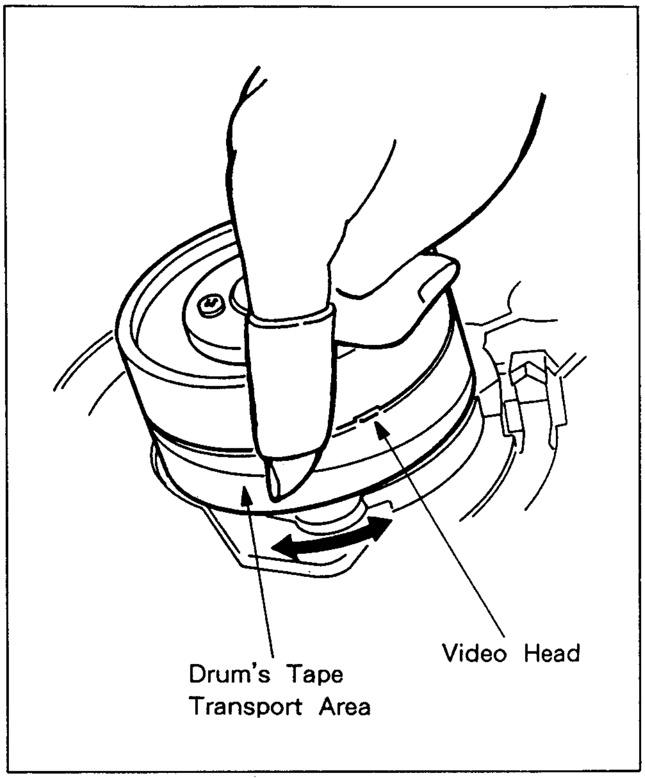

Video Head
Drum's Tape Transport Area

Fig. 4-1-1.

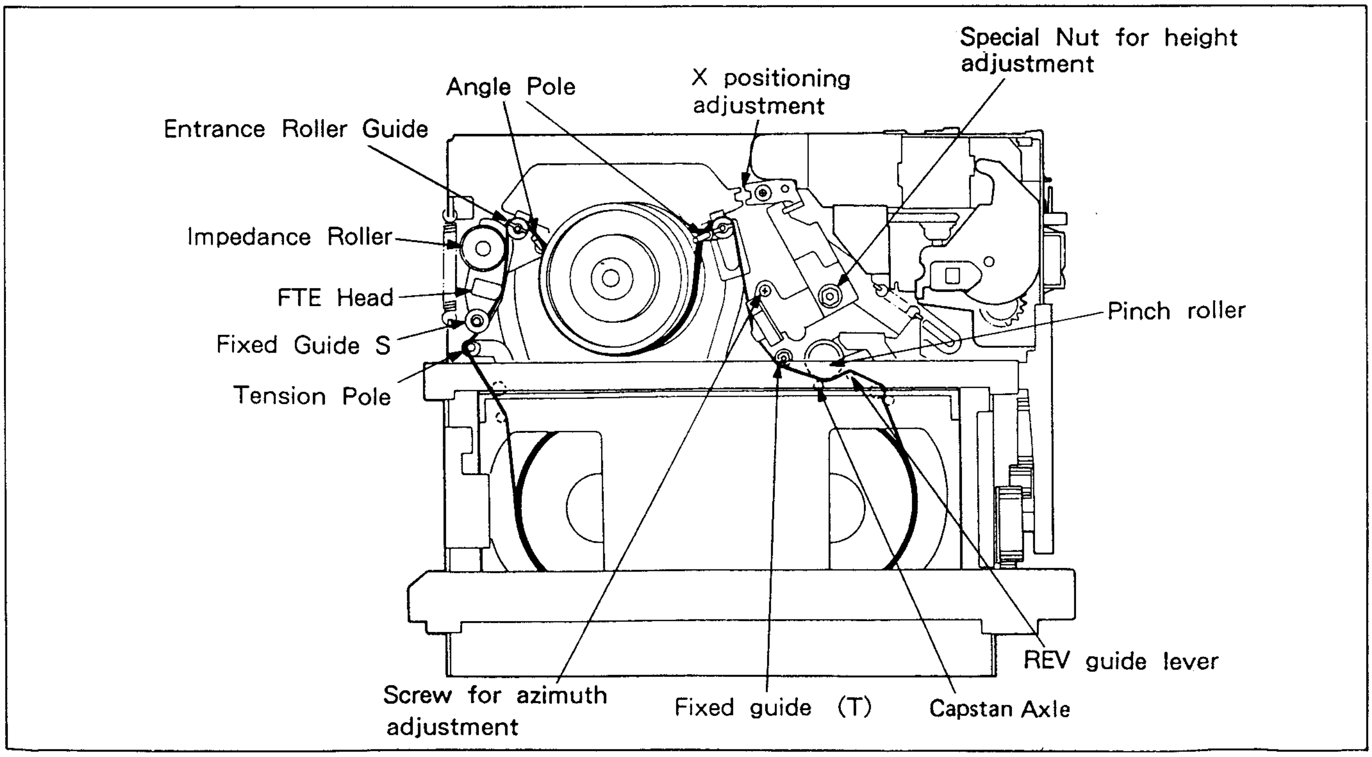
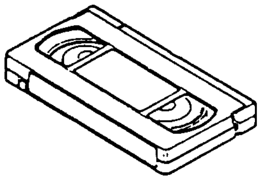

Special Nut for height adjustment
Angle Pole
X positioning adjustment
Entrance Roller Guide
Impedance Roller
FTE Head
Fixed Guide S
Tension Pole
Pinch roller
REV guide lever
Screw for azimuth adjustment
Fixed guide (T)
Capstan Axle

Fig. 4-1-2. Cleaning

4-1-3. Service Jigs

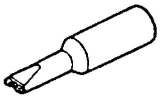
No.	Jig	Jig No.	Remarks
1	Alignment tape	VHJ-0008	SP color bar, 1kHz (normal)
2	Alignment tape	VHJ-0009	SP monoscope, 7kHz (normal)
3	Alignment tape	VHJ-0052	LP monoscope, 3kHz (normal)
4	Eccentric screwdriver	VHJ-0003	For tape path adjustment
5	Nut box	VHJ-0048	For tape path adjustment
6	Torque gauge	VHJ-0004	For reel take-up torque measurement
7	Cassette torquemeter	VHJ-0016	For back tension torque measurement
8	Position adjustment gauge	VHJ-0049	For position adjustment
9	Torque gauge screwdriver	VHJ-0014	For screw fastening torque adjustment
10	3mm dia. bit for torque screwdriver	VHJ-0045	Spare bit for the torque gauge screwdriver
11	Video head removing tool	VHJ-0041	For upper drum removal
12	Cassette stand plate gauge	VHJ-0001	For reel height adjustment
13	Mode selector	VHJ-0050	For mechanism mode selection
14	26-pin flexible flat cable	VHJ-0064	Spare cable for mode selector
15	Mode selector relay board	VHJ-0075	Relay board for mode selector
16	7-wire flat cable	VHJ-0076	Spare cable for relay board
17	REV guide lever removing tool	VHJ-0073	For REV guide lever removal
18	Fixed guide height gauge	VHJ-0053	For fixed guide (S) hight adjustment

VHJ-0008, VHJ-0009, VHJ-0052



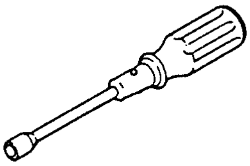
No. 1, 2, 3

VHJ-0003



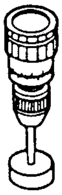
No. 4

VHJ-0048



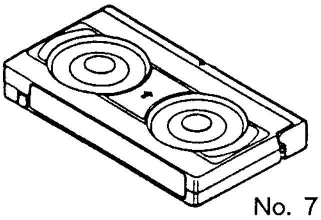
No. 5

VHJ-0004



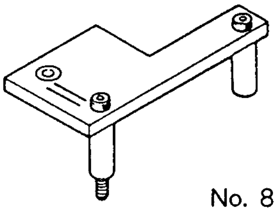
No. 6

VHJ-0016



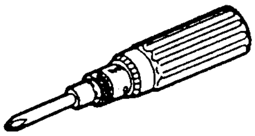
No. 7

VHJ-0049



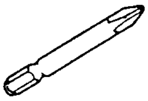
No. 8

VHJ-0014



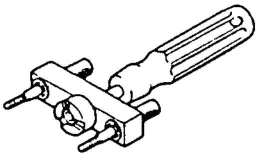
No. 9

VHJ-0045



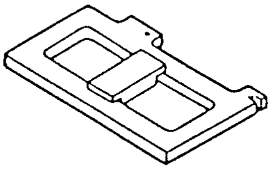
No. 10

VHJ-0041



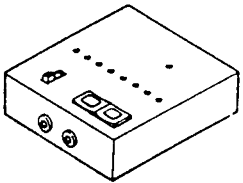
No. 11

VHJ-0001



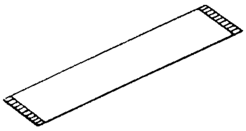
No. 12

VHJ-0050



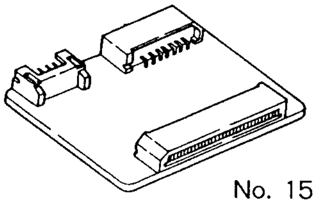
No. 13

VHJ-0064



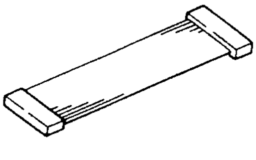
No. 14

VHJ-0075



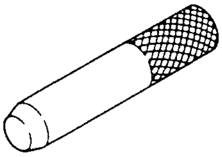
No. 15

VHJ-0076



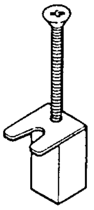
No. 16

VHJ-0073



No. 17

VHJ-0053



No. 18

4-2. MODE SELECTOR (VHJ-0050) HANDLING INSTRUCTIONS

The mode selector drives the loading motor of the P88 mechanism with its internal batteries (UM-2 × 4 = 6V), using LEDS to indicate the mode (EJECT, INITIAL, BRAKE, STOP/REW/FWD, STILL, PLAY, IDLER, REV) simultaneously with EJECT⇔REV mode changes.
Instead of the internal batteries, an external DC 6V power supply can also be used.

4-2-1. Part Names (See Fig. 4-2-1)

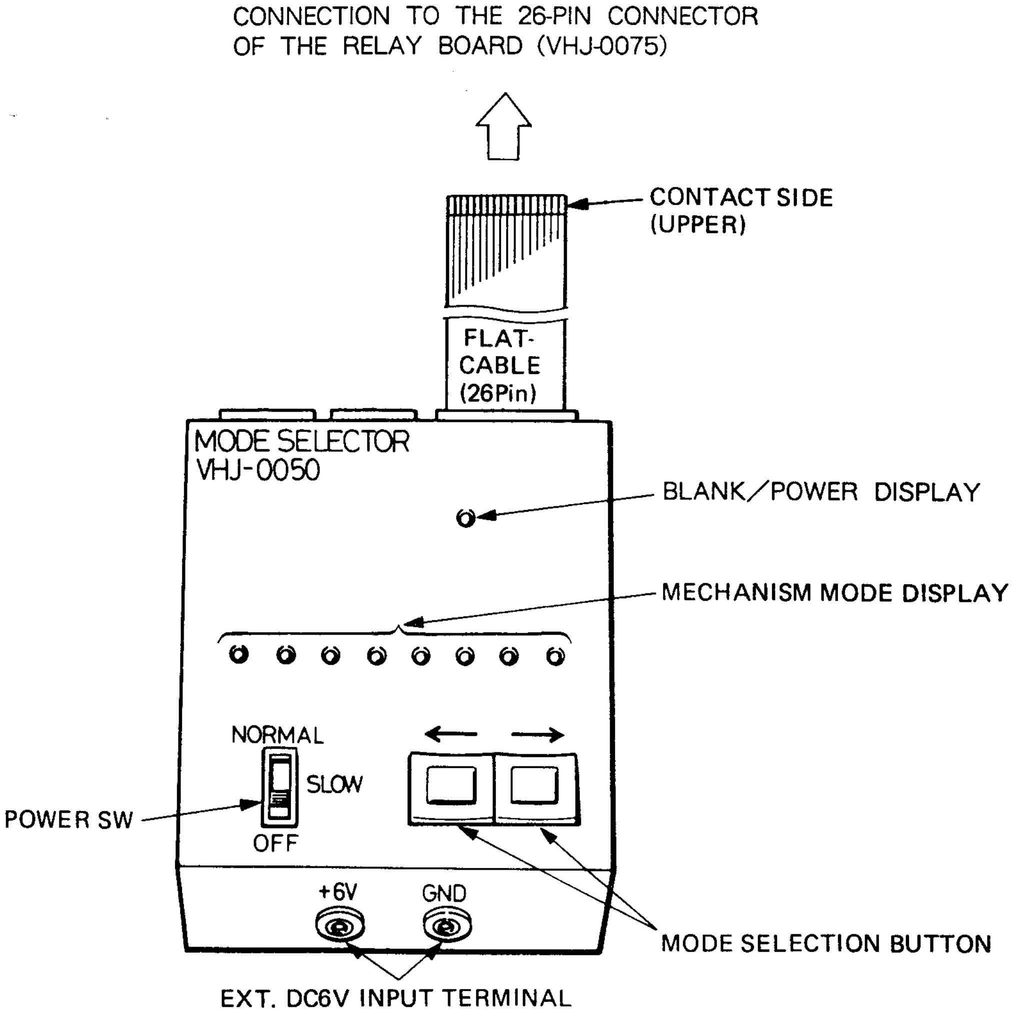

CONNECTION TO THE 26-PIN CONNECTOR
OF THE RELAY BOARD (VHJ-0075)
CONTACT SIDE
(UPPER)
FLAT-
CABLE
(26Pin)
MODE SELECTOR
VHJ-0050
BLANK/POWER DISPLAY
MECHANISM MODE DISPLAY
NORMAL
SLOW
OFF
POWER SW
+6V
GND
MODE SELECTION BUTTON
EXT. DC6V INPUT TERMINAL

Fig. 4-2-1

4-2-2. Connection Method (See Fig. 4-2-2)

1) Remove the 7-wire cable connected from the system control circuit to the connector (CN822) of the MC-3 board.
2) Connect the 7-wire cable (VHJ-0076) between the connector (CN822) of the MC-3 board and the 7-pin connector of the Mode Selector Connection Board (VHJ-0075).
3) Remove the 6-wire cable extending from the cassette holder section from the connector of the System Control Circuit Board and connect it to the 6-pin connector of the Mode Selector Connection Board (VHJ-0075).
4) Connect a supplied 26-pin flat cable (VHJ-0064) of the mode selector (VHJ-0050) between the mode selector body and the 26-pin connector of the Connection Board (VHJ-0075).

Note : Care should be taken to avoid mistaking the direction of the contacting side when connecting a flexible flat cable.

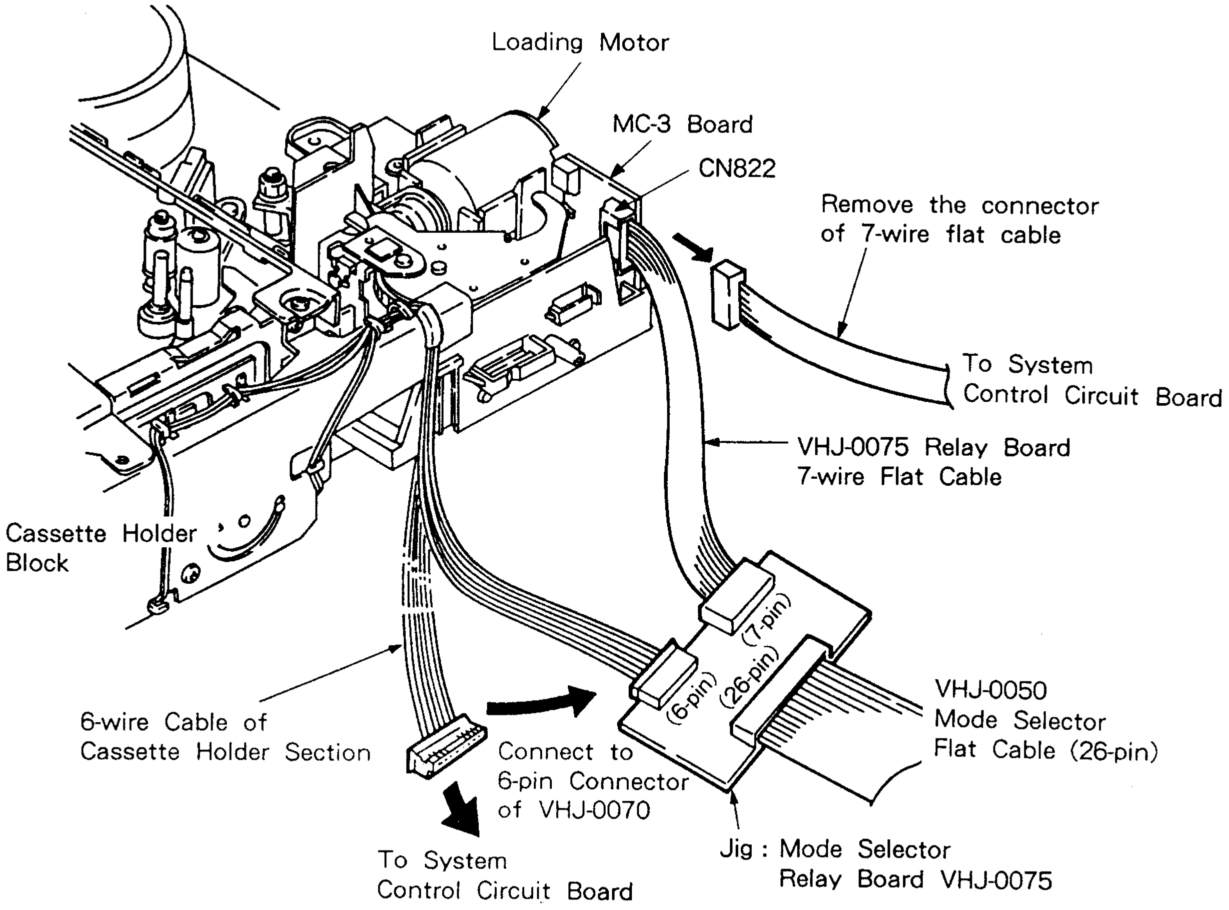

Loading Motor
MC-3 Board
CN822
Remove the connector of 7-wire flat cable
To System Control Circuit Board
VHJ-0075 Relay Board 7-wire Flat Cable
Cassette Holder Block
(7-pin)
(6-pin)
(26-pin)
VHJ-0050 Mode Selector Flat Cable (26-pin)
6-wire Cable of Cassette Holder Section
Connect to 6-pin Connector of VHJ-0070
To System Control Circuit Board
Jig : Mode Selector Relay Board VHJ-0075

Fig. 4-2-2 Connection

4-2-3. Handling Method

1) Keep the right side (⇨) of the mode selector key pressed, and the mode will change in the following sequence : EJECT⇨INITIAL⇨BRAKE⇨STOP/REW/FWD⇨STILL⇨PLAY⇨IDLER⇨REV.
2) When changing the mode in the REV···⇨EJECT direction, press the left side (⇦) of the mode selector key until the desired mode is indicated.
3) In the mid position of each mode during a shift to other mode, the "BLANK" LED lights. But the "PLAY", "IDLER", "REV" LEDs light between the EJECT mode and the INITIAL mode. Be sure therefore to check the mechanism body to see just what state the mechanism is in.
   Incidentally, if the mode selector is not connected to the mechanism, the "BLANK" LED lights to indicate the power ON.
4) The SLOW position of POWER switch makes relatively slow motions in comparison with the NORMAL position.

Note 1 : The mode selector drives the loading motor only, not affecting the head drum motor and the capstan motor. When using the mode selector with a cassette loaded, turn the capstan motor manually to remove tape slackness, preventing tape entanglement.

Note 2 : If the left side (⇦) of the mode selector (VHJ-0050) key is kept pressed with the COMPL cassette mechanism removed, it might get past the EJECT position, causing the front helical gear and the front worm gear to get disengaged.

In this condition, since the front helical gear will not turn even if the right side (⇨) of the mode selector key is pressed, rotate (push) the front helical gear clockwise by hand and engage it with the front worm gear. In this condition, as there is a misalignment between the mechanism main body operation mode (indicated by the mode selector indicator lamps) and the front loading mechanism operation mode, keep the right side (⇨) of the mode selector key pressed until the front helical gear and the front loading gear of the front loading mechanism get back to the initial condition (Refer to A and B in Fig. 5-3-2 of section 5-3-2. Loading Motor).

When the front loading mechanism returns to the initial condition, operation mode of the whole mechanism gets back to normal, matching the mode shown by the mode selector indicator lamps (mode is not properly indicated, however, during EJECT to INITIAL).

Sometimes, engagement of the front helical gear with the front worm gear is delayed, operation mode of the mechanism main body gets too much ahead and the front loading mechanism mode cannot be switched to the initial condition. In that case, press the left side (⇦) of the mode selector key, setting the mechanism main body operation mode back to EJECT (rotation of the mode cam and the MAIN CAM stops).

Note 3 : The mode selector indicator lamps show the mechanism operation mode, but the EJECT lamp may sometimes fail to indicate the actual mechanism operation mode.

5. MECHANISM DISMANTLING AND REASSEMBLING

5-1. MECHANISM MAIN UNIT (See Fig. 5-1-1.)

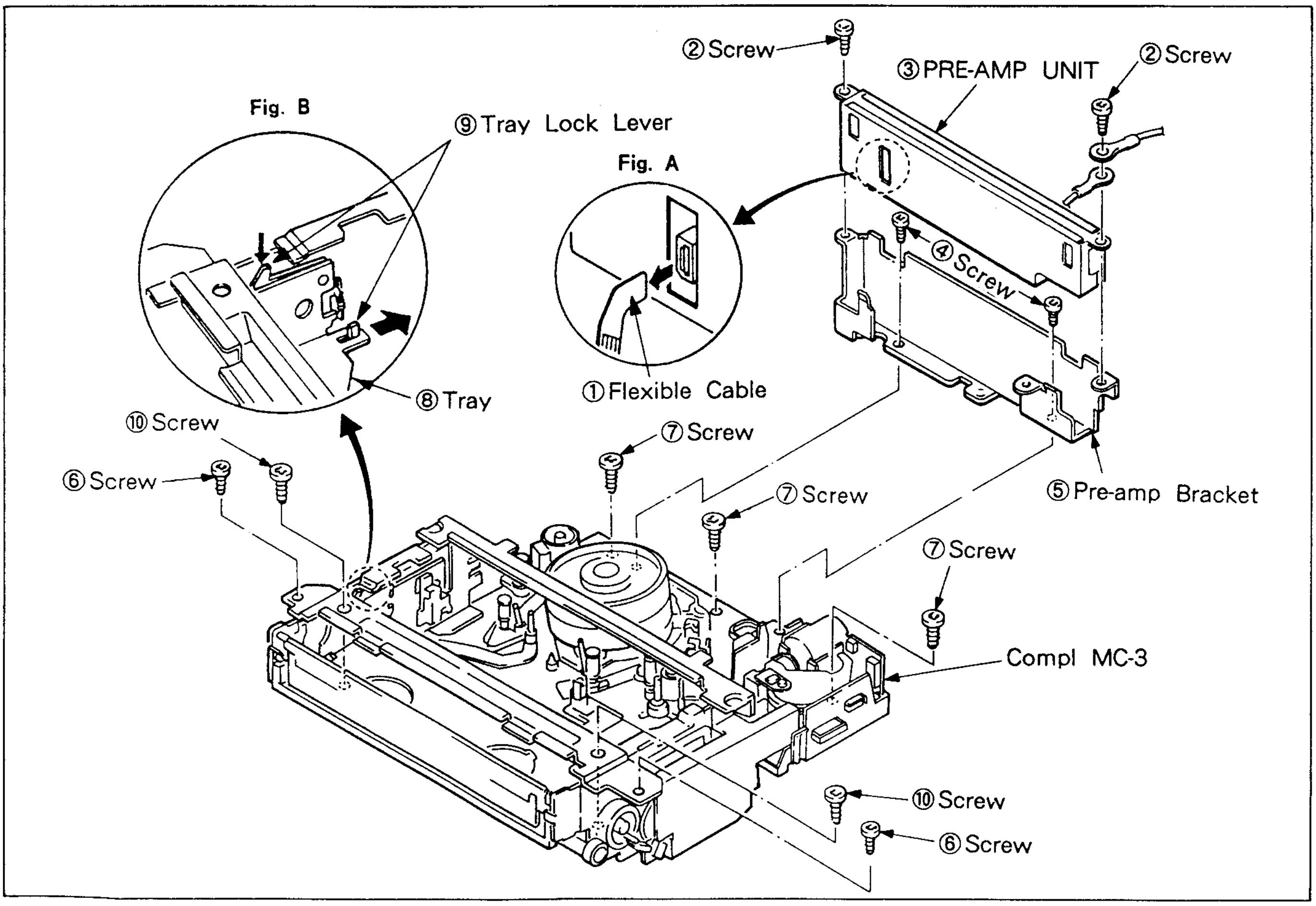
1. Removal

1) Remove the connectors of the COMPL MC-3 and the COMPL HEAD BRACKET.
2) Remove the flexible cable ① connecting the COMPL CYLINDER to the PRE-AMP UNIT ③ (See Fig. A).
3) Remove the two screws ②, then remove the PRE-AMP UNIT ③.
4) Remove the screw ④, then remove the PRE-AMP. BRACKET ⑤.
5) Remove the two screws ⑥.
6) Remove the three screws ⑦ and two screws ⑩, then lift up the mechanism main unit and remove it.
   Since the TRAY ⑧ obstructs removal of the two front screws ⑩, move the TRAY LOCK LEVER ⑨ in the direction of the arrow to unlock, then slide the TRAY ⑧ before removing the screws. (See Fig. B)

Note : Shape of the PRE-AMP UNIT ③ and the PRE-AMP. BRACKET ⑤ differ depending on the model.

2. Remounting

1) Mount the mechanism main unit onto the chassis with the three screws ⑦ and two screws ⑩.
2) Tighten the two screws ⑥.
3) Mount the PRE-AMP. BRACKET ⑤ with the two screws ④.
4) Mount the PRE-AMP UNIT ③ and the ground lug with the two screws ② (some models are not provided with a ground lug).
5) Insert the flexible cable ① into the connector of the PRE-AMP UNIT.
6) Connect the connectors of COMPL MC-3 and COMPL HEAD BRACKET.



②Screw
③PRE-AMP UNIT
②Screw
Fig. B
⑨Tray Lock Lever
Fig. A
④Screw
⑧Tray
①Flexible Cable
⑩Screw
⑦Screw
⑥Screw
⑦Screw
⑤Pre-amp Bracket
⑦Screw
Compl MC-3
⑩Screw
⑥Screw

Fig. 5-1-1 Mecahnism Main Unit

5-2. CASSETTE HOLDER MECHANISM

5-2-1. COMPL Cassette Mechanism (See Fig. 5-2-1.)

1. Removal

1) Set the video main unit to the EJECT completed mode.
2) Pull out the connectors (6-PIN CONNECTOR connected to the system control circuit board, ACE HEAD CONNECTOR, and FTE HEAD CONNECTOR) from CASSETTE HOLDER.
3) Remove the two screws ①.
4) Remove the two screws ②.
5) Lift up the COMPL CASSETTE MECHANISM ④ back a little and remove the two hooks ③ on the front (See Fig. B). When doing so, make sure that the SAFETY SWITCH LEVER is not caught by the mechanism chassis.

2. Remounting

1) Set the chassis section mechanism to the EJECT mode with the mode selector (VHJ-0050) (looking from above, match the front loading gear hole ⑤ with the MOTOR HOLDER hole ⑥ as shown in Fig. A).
2) Set the COMPL CASSETTE MECHANISM ④ to the EJECT completed mode.
3) Mount the COMPL CASSETTE MECHANISM ④ onto the mechanism chassis, aligning it with the protuberance.
   Match positions of the FRONT LOADING GEAR △ mark ⑦ and the RACK EJECT mark ⑧. (See Fig. A.)
4) Fix to the mechanism chassis with the two screws ②.
5) Fix to the chassis with the screw ①.
6) Connect to the various connectors.

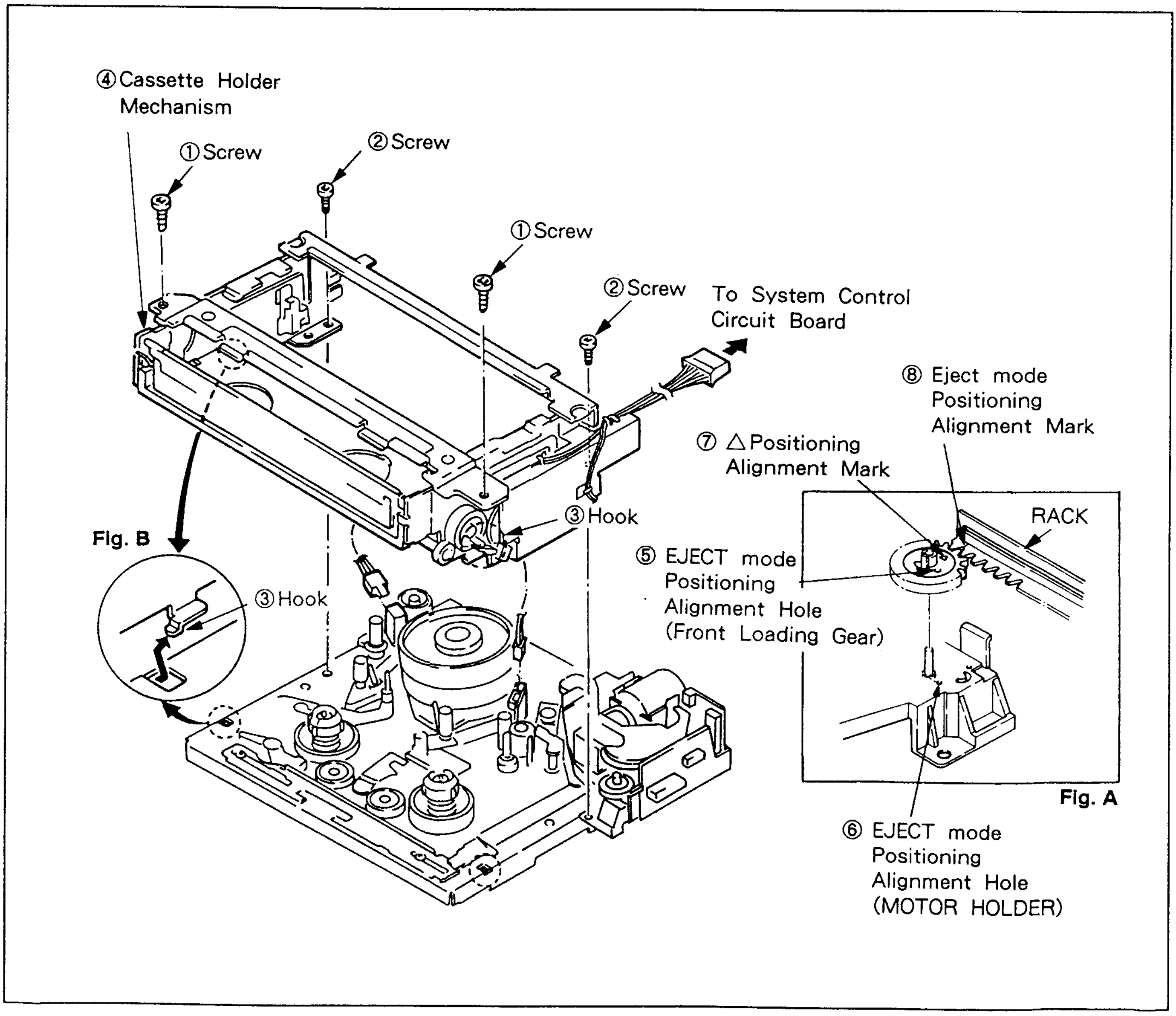

④Cassette Holder Mechanism
①Screw
②Screw
①Screw
②Screw
To System Control Circuit Board
⑧ Eject mode Positioning Alignment Mark
⑦ △Positioning Alignment Mark
RACK
③Hook
⑤ EJECT mode Positioning Alignment Hole (Front Loading Gear)
Fig. B
③Hook
Fig. A
⑥ EJECT mode Positioning Alignment Hole (MOTOR HOLDER)

Fig. 5-2-1 Compl Cassette Mechanism

5-2-2. Gear Bracket Ass'y (See Fig. 5-2-2.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the four screws ①, then remove the GEAR BRACKET ASS'Y ②.
3) Remove the E ring ③, then remove the LOCK GEAR ④, the PINION LEVER ASS'Y ⑤, the PINION GEAR ⑥ and the RACK ⑦, in that order.

2. Remounting

1) Apply grease to the shaft ⑧ and the two pins ⑨ of the GEAR BRACKET ASS'Y.
2) Apply grease to the pin ⑩ of the PINION LEVER ASS'Y.
3) Apply grease to the toothed part of the RACK ⑦.
4) Fit the RACK ⑦ onto the two pins ⑨. Match position of the hole ⑪ to the GEAR BRACKET hole ⑫.
5) Mount the PINION GEAR ⑥, PINION LEVER ASS'Y ⑤, and LOCK GEAR ④ in the shaft ⑧ in the order mentioned.
   Set the hole ⑬ of the PINION GEAR and the LOCK GEAR with the hole ⑪ of the RACK for proper positioning at that time.
6) Mount them in E-ring shaft.
7) Set the GEAR BRACKET ASS'Y ② to the dowel and mount it using four screws ①.
   Set the hole Ⓐ of the IDLER GEAR with the hole Ⓑ of the SIDE BOARD as shown in Fig. 5-2-3 at this time.
   Also set the hole ⑬ of the PINION GEAR and the LOCK GEAR with the hole ⑫ of the GEAR BRACKET by referring to Fig. 5-2-2. After mounting them, check to be sure that FL START SWITCH ⑭ is in the ON state shown in Fig. A.
8) Remount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

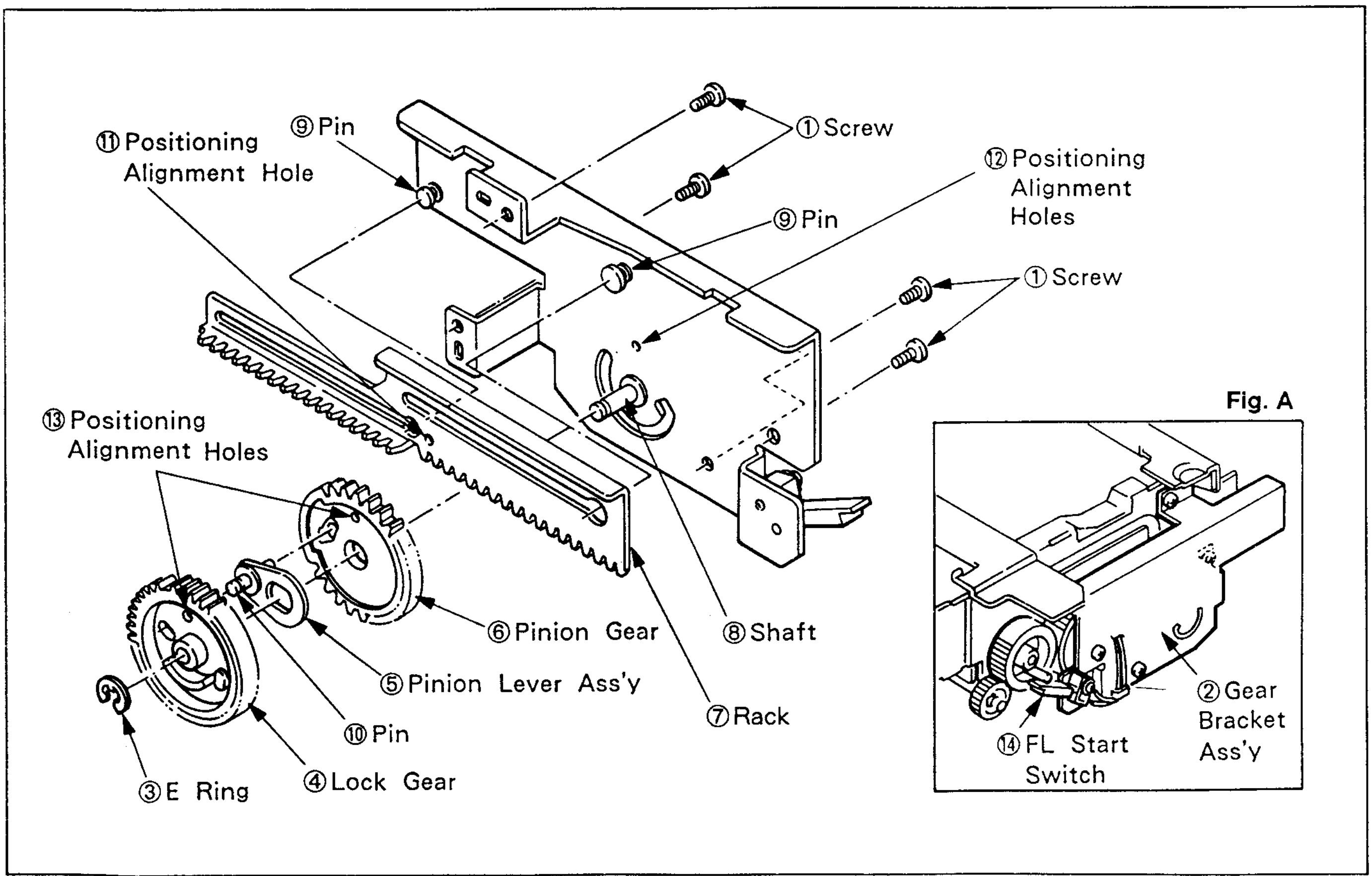

⑪ Positioning Alignment Hole
⑨ Pin
① Screw
⑫ Positioning Alignment Holes
⑨ Pin
① Screw
⑬ Positioning Alignment Holes
⑥ Pinion Gear
⑧ Shaft
⑤ Pinion Lever Ass'y
⑦ Rack
⑩ Pin
③ E Ring
④ Lock Gear
Fig. A
② Gear Bracket Ass'y
⑭ FL Start Switch

Fig. 5-2-2. Gear Bracket Ass'y

5-2-3. Cassette Drive Gear (Right) (See Fig. 5-2-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM and the GEAR BRACKET ASS'Y as instructed in 5-2-1. and 5-2-2., respectively.
2) Remove the IDLER GEAR ①.
3) Remove the SPRING COIL ②, then remove the MAIN GEAR ③.
4) Remove the E ring ④, then remove the LEVER GEAR ASS'Y R ⑤.
5) Open the hook ⑥ and remove the COUPLE GEAR R ⑦. Take care not to open the hook ⑥ too much, otherwise it may get deformed or broken. If it does, replace it.
6) Remove the IDLER GEAR R ⑧.

2. Remounting

1) Apply grease to gear parts that undergo friction.
2) Mount the IDLER GEAR R ⑧ onto the axle ⑨.
3) Mount the COUPLE GEAR R ⑦ onto the ROD ASS'Y axle ⑩. When doing so, match the couple gear position with the IDLER GEAR R ⑧ as shown in Fig. A.
4) Mount the LEVER GEAR ASS'Y R ⑤ onto the axles ⑪ and ⑫. Match position to the IDLER GEAR R ⑧ as shown in Fig. A.
5) Mount the E ring ④ onto the axle ⑫.
6) Mount the MAIN GEAR ③ onto the axle ⑪. When doing so, match position to the IDLER GEAR R ⑧ as shown in Fig. A.
7) Hook the SPRING COIL ② to the notch ⑬ in the MAIN GEAR R ③ and the LEVER GEAR ASS'Y R.
8) Mount the IDLER GEAR ① onto the axle ⑭. When doing so, match position to the MAIN GEAR as shown in Fig. A.
9) Mount the GEAR BRACKET ASS'Y and the COMPL CASSETTE MECHANISM ASS'Y as instructed in 5-2-2. and 5-2-1., respectively.

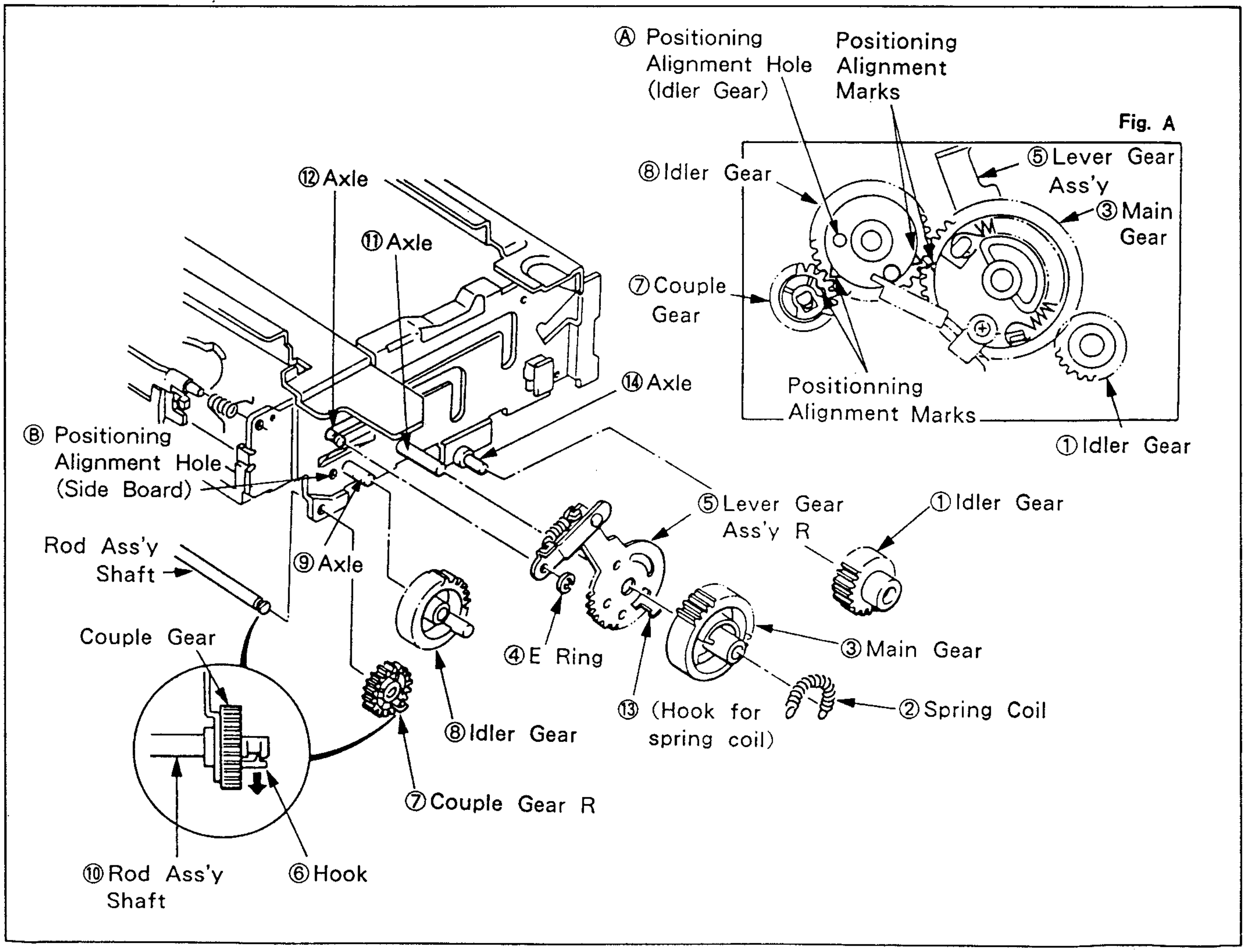

Ⓐ Positioning Alignment Hole (Idler Gear)
Positioning Alignment Marks
Fig. A
⑧Idler Gear
⑤Lever Gear Ass'y
③Main Gear
⑦Couple Gear
Positionning Alignment Marks
①Idler Gear
⑫Axle
⑪Axle
⑭Axle
Ⓑ Positioning Alignment Hole (Side Board)
Rod Ass'y Shaft
⑨Axle
Couple Gear
⑤Lever Gear Ass'y R
①Idler Gear
④E Ring
③Main Gear
⑬ (Hook for spring coil)
②Spring Coil
⑧Idler Gear
⑦Couple Gear R
⑩Rod Ass'y Shaft
⑥Hook

Fig. 5-2-3. Cassette Drive Gears (Right Side)

5-2-4. Cassette Drive Gear (Left) (See Fig. 5-2-4)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the COUPLE GEAR R as instructed in 5-2-3.
3) Remove the ROD ASS'Y ①.
4) Remove the E ring ②.
5) Remove the hook ③, then remove the LEVER GEAR ASS'Y L ④. Take care not to open the hook ③ too much, otherwise it may get deformed or broken. If it does, replace it.
6) Remove the SPRING COIL ⑤ from the LEVER GEAR ASS'Y ④.
7) Remove the IDLER GEAR L ⑥ and the DOOR OPEN LEVER ⑦.

2. Remounting

1) Apply grease to the axles ⑧, ⑨ and ⑩.
2) Apply grease to the IDLER GEAR L ⑥.
3) Mount the DOOR OPEN LEVER ⑦ onto the axle ⑧. Do it so that the end of the DOOR OPEN LEVER ⑦ leans against the front side of the CASSETTE DOOR ⑪ as shown in Fig.. A.
4) Mount the IDLER GEAR L ⑥ onto the axle ⑧.
5) Pass the ROD ASS'Y ① through the hole ⑫. Match position of the COUPLE GEAR L ⑬ and the IDLER GEAR L ⑥ as shown in Fig B.
6) Mount the COUPLE GEAR R as instructed in 5-2-3.
7) Hook the SPRING COIL ⑤ to the LEVER GEAR ASS'Y L ④.
8) Mount the LEVER GEAR ASS'Y L ④ onto the axle ⑨ and the shaft ⑩. Match position to the IDLER GEAR L ⑥ as shown in Fig. B.
9) Mount the COMPL CASSETTE MECHANISM onto the chassis as instructed in 5-2-1.

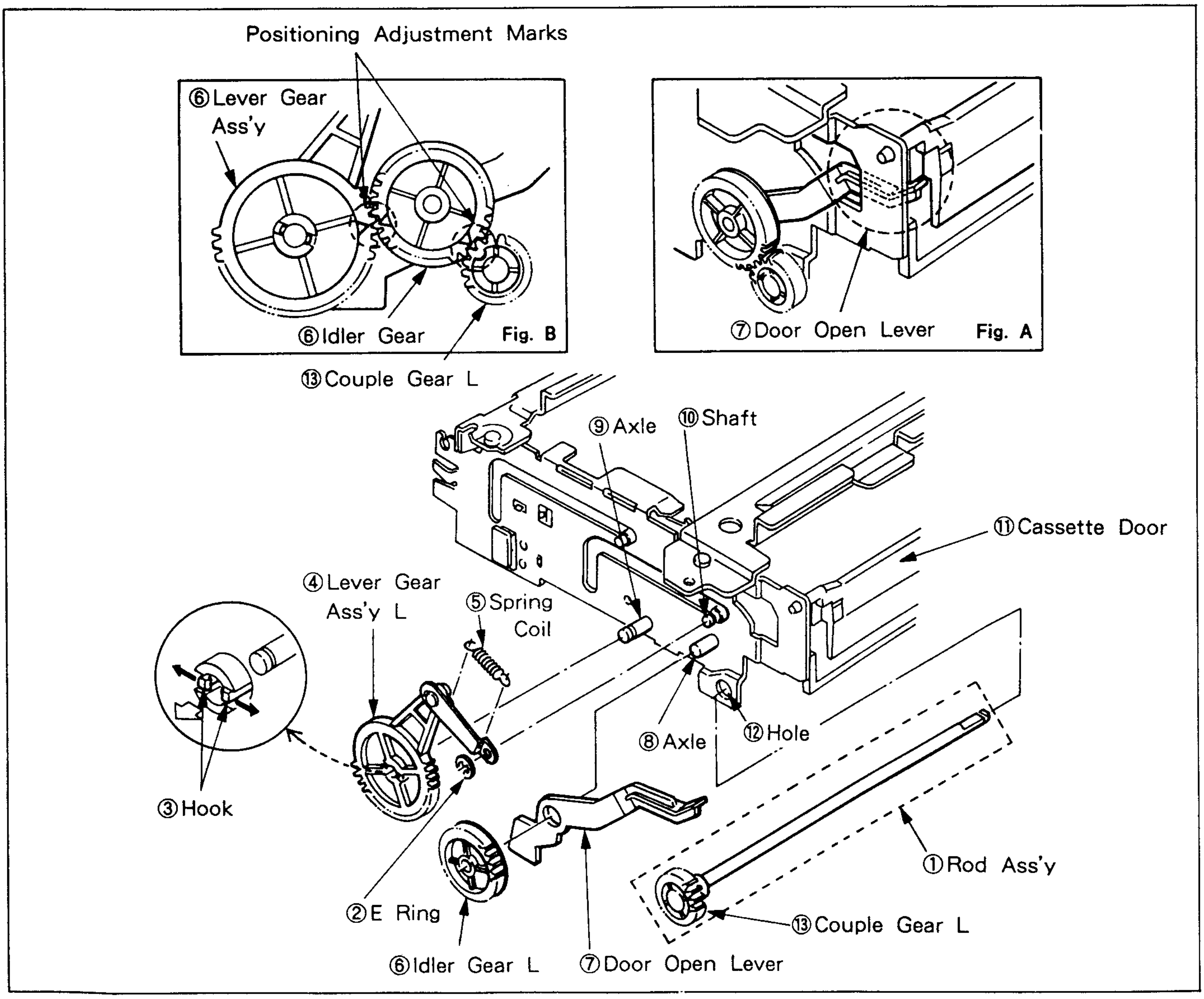

Positioning Adjustment Marks
⑥Lever Gear Ass'y
⑥Idler Gear
⑬Couple Gear L
Fig. B
⑦Door Open Lever
Fig. A
⑨Axle
⑩Shaft
⑪Cassette Door
④Lever Gear Ass'y L
⑤Spring Coil
③Hook
⑧Axle
⑫Hole
①Rod Ass'y
②E Ring
⑬Couple Gear L
⑥Idler Gear L
⑦Door Open Lever

Fig. 5-2-4. Cassette Drive Gears (Left Side)

5-2-5. FL Start Switch (See Fig. 5-2-5.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the screw ①.
3) Remove the lead wire of the FL START SWITCH ②.

2. Remounting

1) Solder the lead wire to the FL START SWITCH ② terminal.
2) Align the FL START SWITCH ② protuberance to the hole ⑤, then mount it onto the GEAR BRACKET ASS'Y ③ with the screw ①. Do it so that the FL START SWITCH ② is turned ON by holding the pin ④ of IDLER GEAR in the EJECT completed mode.
3) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

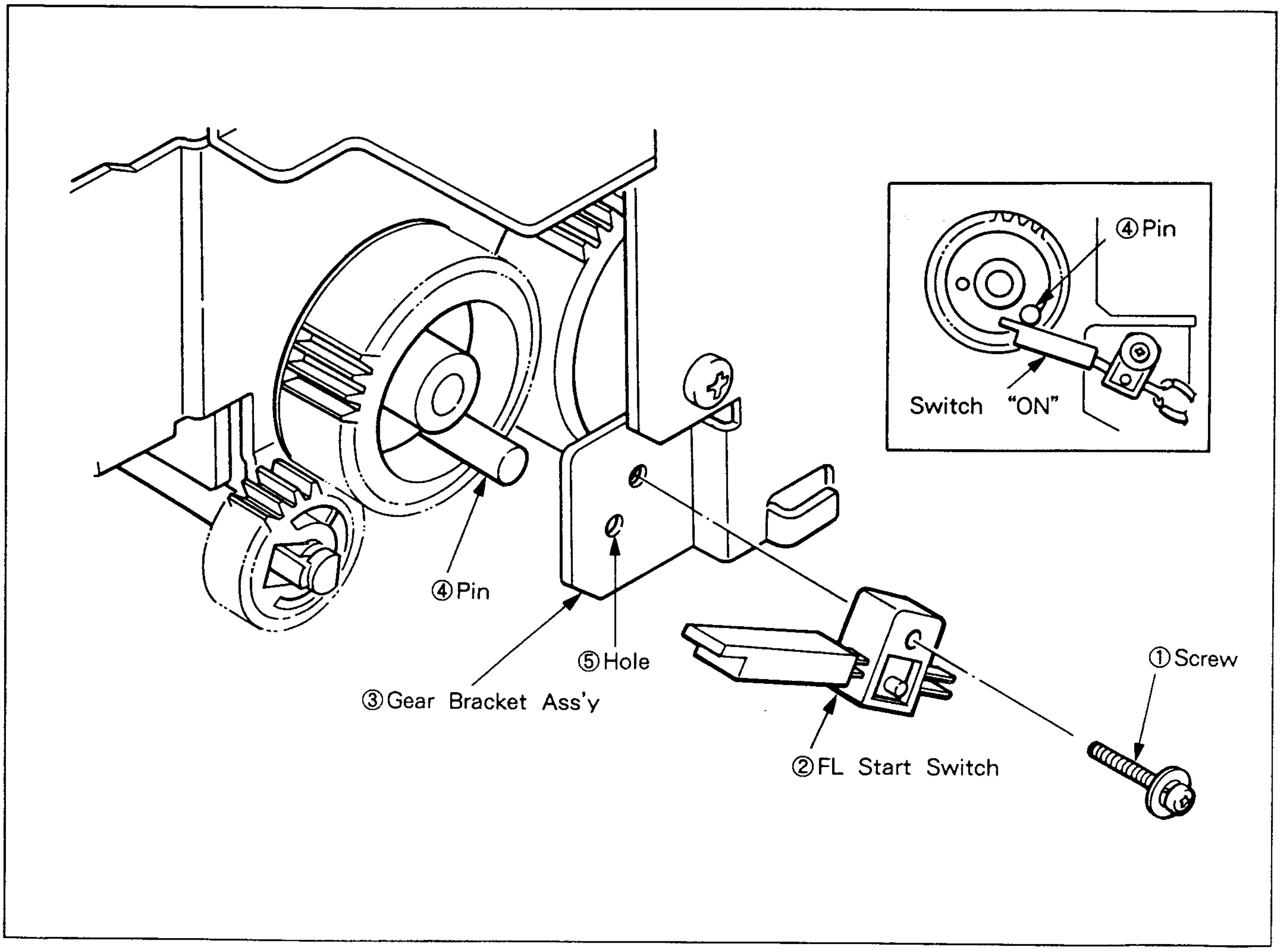

④Pin
Switch "ON"
④Pin
⑤Hole
③Gear Bracket Ass'y
①Screw
②FL Start Switch

Fig. 5-2-5. FL Start Switch

5-2-6. T-Top Sensor, T-End Sensor (See Fig. 5-2-6.)

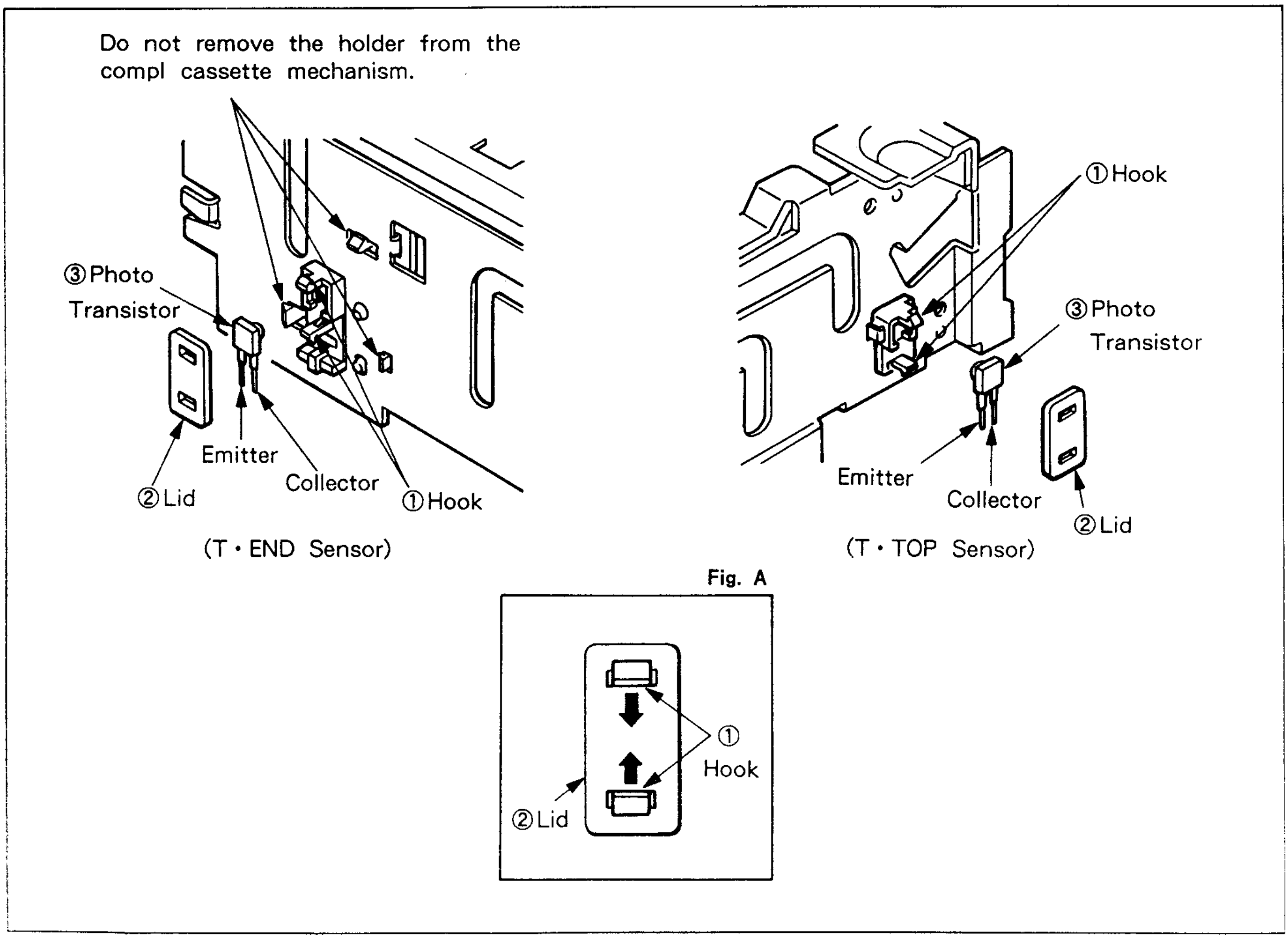
1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) When removing the T-TOP SENSOR, remove the GEAR BRACKET ASS'Y as instructed in 5-2-2.
3) Unhook the hook ① as instructed in Fig. A, then remove the LID ②. Take care not to push the hook ① too much, otherwise it may be deformed or broken.
4) Remove the phototransistors ③, then remove the lead wire.

Note : Mounting position of the transistor holder on the T-END SENSOR side is precisely adjusted at the factory, so do never remove it from the COMPL CASSETTE MECHANISM.

2. Remounting

1) Solder the brown lead wire to the emitter side, and the red lead wire to the collector side of the T-TOP SENSOR phototransistor ③.
   Solder the orange lead wire to the emitter side, and the yellow lead wire to the collector side of the T-END SENSOR phototransistor.
2) Mount the phototransistors ③ onto their respective holders.
3) Mount the LID ② and fix it with the hook ①.
4) Mount the GEAR BRACKET ASS'Y as instructed in 5-2-2.
5) Mount the COMPL CASSETTE MECHANISM as insturcted in 5-2-1.


Do not remove the holder from the compl cassette mechanism.
③Photo Transistor
Emitter
Collector
②Lid
①Hook
①Hook
③Photo Transistor
Emitter
Collector
②Lid
①
Hook
②Lid

(T • END Sensor)

(T • TOP Sensor)

Fig. A

Fig. 5-2-6. T TOP Sensor & T END Sensor

5-3. COMPL HOLDER MOTOR (LOADING MOTOR BLOCK)

5-3-1. COMPL Motor Bracket

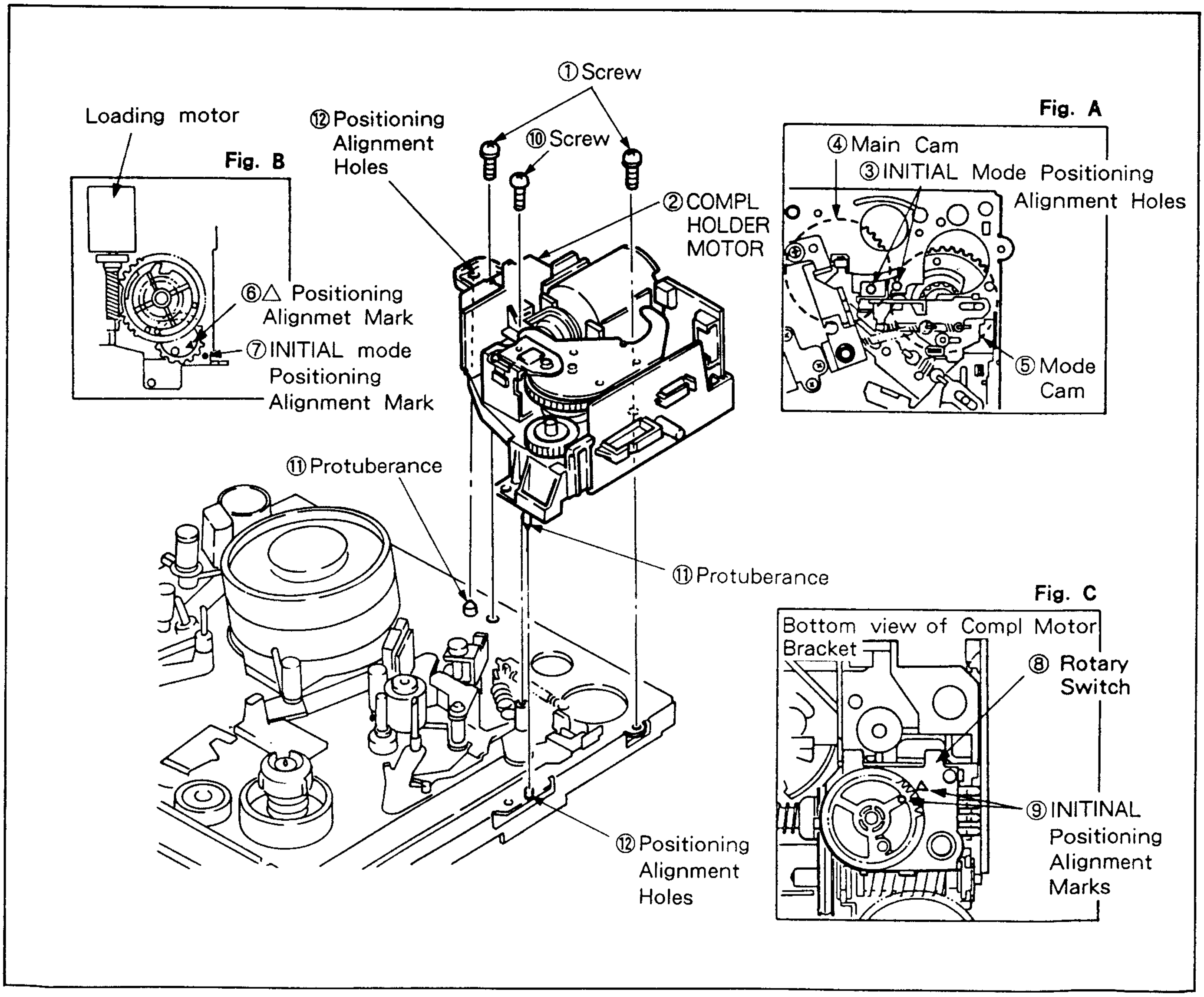
1. Removal

1) Remove the PRE-AMP UNIT and the PRE-AMP. BRACKET as instructed in 5-1.
2) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
3) Remove the two screws ① and the other one ⑩, then remove the COMPL HOLDER MOTOR ② (see Fig. 5-3-1.).

2. Remounting

1) Set the mechanism chassis to the INITIAL mode. In this mode, look at the mechanism chassis positioning holes ③ just from above and align the MAIN CAM ④ and MODE CAM ⑤ positioning holes as shown in Fig. A.
2) Set the COMPL HOLDER MOTOR ② to the INITIAIL mode with the mode selector (VHJ-0050). In this position, the FRONT LOADING GEAR △ mark ⑥ is aligned with the MOTOR HOLDER INITIAL mode position mark ⑦ (see Fig. B.).
3) Align the ROTARY SWITCH (mode detector switch) ⑧ with the INITIAL mode position mark ⑨ (see Fig. C.).
4) Align the COMPL HOLDER MOTOR main unit ② with the protuberance ⑪, then mount it with the two screws ① and the other one ⑩.
5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
6) Mount the PRE-AMP UNIT and the PRE-AMP. BRACKET as instructed in 5-1.

Note : Normal mechanism operation cannot be achieved if initial positioning of the MAIN CAM ④, the MODE CAM ⑤ and the ROTARY SWITCH (mode detector switch) ⑧ are not performed precisely.



①Screw
⑩Screw
⑫Positioning Alignment Holes
②COMPL HOLDER MOTOR
Loading motor
Fig. B
⑥△ Positioning Alignmet Mark
⑦INITIAL mode Positioning Alignment Mark
⑪Protuberance
⑪Protuberance
⑫Positioning Alignment Holes
Fig. A
④Main Cam
③INITIAL Mode Positioning Alignment Holes
⑤Mode Cam
Fig. C
Bottom view of Compl Motor Bracket
⑧ Rotary Switch
⑨INITINAL Positioning Alignment Marks

Fig. 5-3-1 Compl Holder Motor

5-3-2. Loading Motor (Refer to Fig. 5-3-2.)

1. Removal

LOADING MOTOR can be replaced after LOADING MOTOR BLOCK unit has been removed by referring to 5-3-1. The 1990 version of the mechanism allows LOADING MOTOR itself to be replaced without removing CASSETTE HOLDER BLOCK and LOADING MOTOR BLOCK. The following describes this procedure.

1) Use MODE SELECTOR (VHJ-0050) to set the mechanism to the initial mode.
2) Remove the connector for DEW SENSOR connected to the MC-3 board ①.
3) Remove three screws ② and remove HOLDER BRACKET ④ with FRONT WORM ASS'Y ③ still attached.
4) Remove DAMPER ⑥ attached to the pulley of LOADING MOTOR ⑤.
5) Remove FRONT HELICAL GEAR ⑦ and WASHER ⑧.
6) Remove soldered LEAD WIRE from the terminal of LOADING MOTOR ⑤.
7) Remove LOADING BELT ⑨.
8) Remove LOADING MOTOR ⑤ by lifting up from the back terminal side.

2. Remounting

Before attaching LOADING MOTOR ⑤ to MOTOR BRACKET ASS'Y ⑩, confirm DAMPER ⑪ and DAMPER ⑫ shown in Fig. 5-3-5. are in the proper position on MOTOR BRACKET ASS'Y ⑩.

1) LOADING MOTOR ⑤ puts REAR SIDE BOSS ㉓ in the slit ㉔ of MOTOR HOLDER ⑩.
   Further, mount the tap hole ⑬ at two points of the front pulley side so that the it is secured to the PROTUBERANCE ⑭ of the MOTOR HOLDER at two points.
2) Solder the lead wire from the MC-3 board to LOADING MOTOR ⑤ terminal. (Solder the red lead wire to the positive terminal side.)
3) Hang LOADING BELT ⑨ on the pulley.
4) After hanging BELT ⑨ on the pulley, confirm that the mechanism unit is in the initial mode. The initial mode is indicated by Fig. A of Fig. 5-3-2., and is the position in which INITIAL POSITIONING ALIGNMENT HOLEs of MAIN CAM ⑮ and MODE CAM ⑯ are lined up with THROUGH HOLE ⑰ of MOTOR HOLDER. If the initial mode is not selected, adjust with MODE SELECTOR (VHJ-0050).
5) As shown in Fig. B, confirm the positions of the △ POSITIONING ALIGNMENT MARK on FRONT LOAD GEAR ⑱ and INITIAL MARK ⑲ position of MOTOR HOLDER and the position relationship of CASSETTE HOLDER RACK ⑳.
6) Apply a light coat of grease to the entire sides of AXLE ㉑ and FRONT HELICAL GEAR ⑦.
7) Attach FRONT HELICAL GEAR ⑦ and WASHER ⑧ to AXLE ㉑. As shown in Fig. C, FRONT HELICAL GEAR ⑦ is attached so that the indent on the side is inside PIN ㉒ of FRONT LEVER ASS'Y.
8) Attach DAMPER ⑥ to LOADING MOTOR ⑤ pulley.
9) HOLDER BRACKET ④ is attached by engaging FRONT WORM ASS'Y ③ with LOADING MOTOR ⑤ pulley, and held in place with three screws ②.
10) Attach the connector of DEW SENSOR ㉕ to the MC-3 board ① and return the mechanism to the eject completion using MODE SELECTOR.

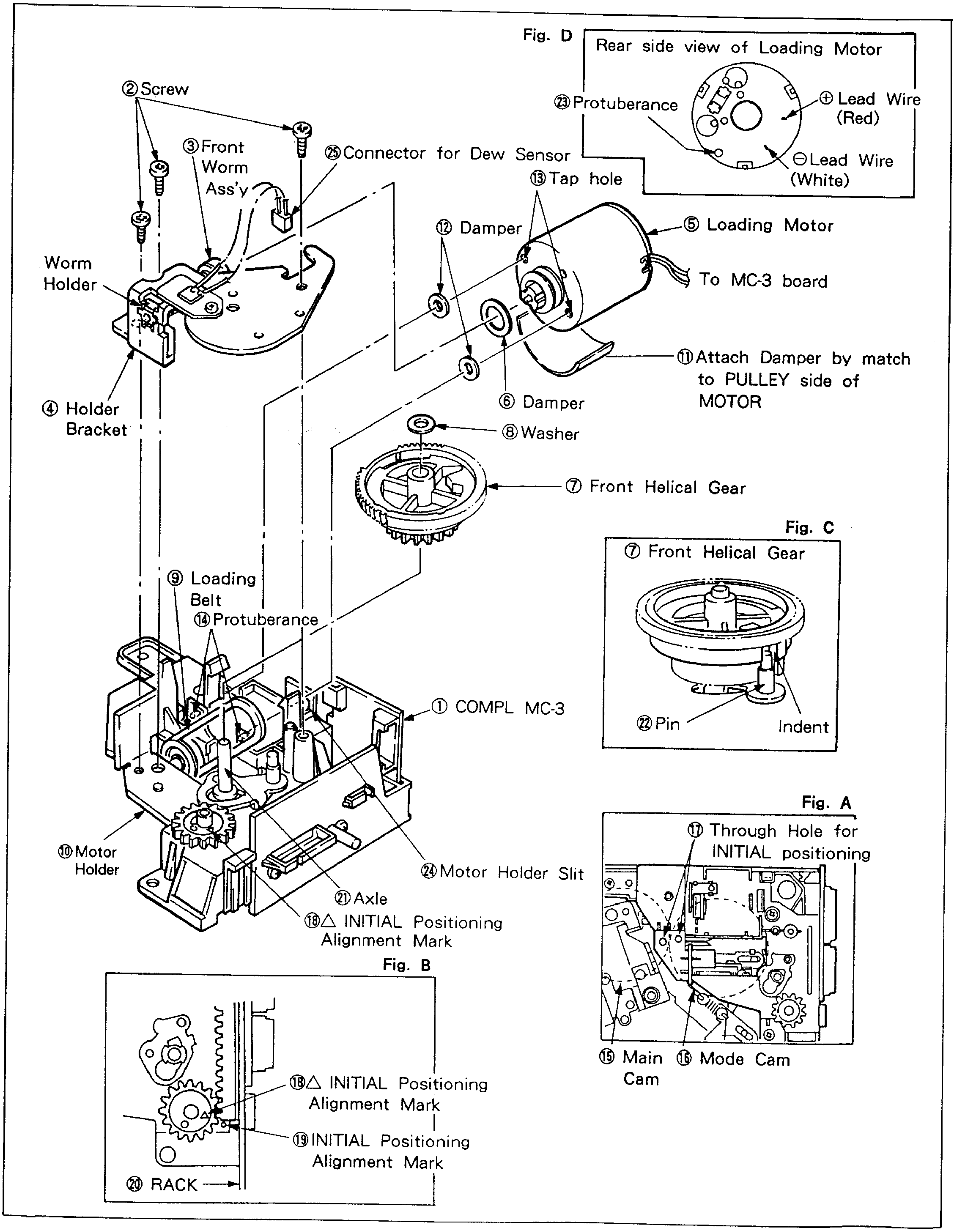


Fig. D
Rear side view of Loading Motor
㉓Protuberance
⊕ Lead Wire (Red)
⊖Lead Wire (White)
②Screw
③Front Worm Ass'y
㉕Connector for Dew Sensor
⑬Tap hole
⑫ Damper
⑤ Loading Motor
To MC-3 board
Worm Holder
⑪Attach Damper by match to PULLEY side of MOTOR
④ Holder Bracket
⑥ Damper
⑧Washer
⑦ Front Helical Gear
Fig. C
⑦ Front Helical Gear
㉒Pin
Indent
⑨ Loading Belt
⑭Protuberance
① COMPL MC-3
⑩Motor Holder
㉔Motor Holder Slit
㉑Axle
⑱△ INITIAL Positioning Alignment Mark
Fig. A
⑰ Through Hole for INITIAL positioning
⑮ Main Cam
⑯ Mode Cam
Fig. B
⑱△ INITIAL Positioning Alignment Mark
⑲INITIAL Positioning Alignment Mark
⑳ RACK

Fig. 5-3-2. Loading Motor

5-4. TAPE LOADING MECHANISM

5-4-1. Main Parts of the Tape Loading Mechanism (See Fig. 5-4-1.)

1. Removal

1) Remove connectors from the DRUM MOTOR board (SV-5).
2) Remove the three screws ①, then remove the REINFORCE BRACKET ②.
3) Remove the two special washers ③, then remove the LOAD RACK ④.
4) Remove the special washer ⑤, then remove the CAM LOAD LEVER ASS'Y ⑥.
5) Remove the stop washer ⑦, then remove the MAIN CAM ⑧.
6) Unhook the LOAD GEAR T hook ⑩, then remove the LOAD GEAR T ⑨ as shown in Fig. A, with the SPRING COIL ⑪ and the LOAD LEVER ASS'Y T ⑫ attached to it.
7) Unhook the LOAD GEAR S hook ⑭, then remove the LOAD GEAR S ⑬ as shown in Fig. B, with the SPRING COIL S ⑮ and the LOAD LEVER ASS'Y S ⑯ attached to it.

Note : Take care not to open the LOAD GEAR hooks too much, otherwise they may be deformed or broken. If they are, replace them.

2. Remounting

1) Apply grease to the inner surface of the LOAD LEVER ASS'Y S ⑯ hole ⑰, as shown in Fig. B.
2) Apply grease to the inner surface of the LOAD LEVER ASS'Y T ⑫ hole ㉒ and to the section of the LOAD GEAR T ⑨ indicated with an arrow in Fig. C.
3) Apply grease to GROOVEs 1 and 2 of the MAIN CAM ⑧, and to the outer side of the teeth.
4) Apply grease to the three oval holes of the LOAD RACK ④ as shown in Fig. D.
5) Apply grease to the outer surface of axles ⑲ ⑳㉖ and ㉘.
6) After assembling as shown in Fig. B, mount the LOAD GEAR S ⑬ onto the axle ⑲. Insert the ROLLER BASE S pin ⑱ into the LOAD LEVER ASS'Y S hole ⑰.
7) After assembling as shown in Fig. A, mount the LOAD GEAR T ⑨ onto the axle ⑳. When doing so, set the LOAD GEAR S ⑬ and the LOAD GEAR T ⑨ to the INITIAL mode position ㉑. Insert the ROLLER BASE T pin ㉓ into the hole ㉒ of the LOAD LEVER ASS'Y T ⑫.
8) Mount the MAIN CAM ⑧ on the axle ㉖. At that time, make sure that the positioning hole ㉕ of the MAIN CAM ⑧ and the MODE CAM ㉔ matches the initial positioning hole ㉞ of the MECHANISM CHASSIS. Also check to be sure that the Pin ㉗ of the CAM PINCH LEVER ASS'Y is put in the groove 1 of the MAIN CAM as shown in Fig. E.
9) Mount the special washer ⑦ to the axle ㉖.
10) Mount the CAM LOAD LEVER ASS'Y ⑥ onto the axle ㉘. Insert the pin ㉙ into the MAIN CAM GROOVE 2 as shown in Fig. E.
11) Mount the special washer ⑤ onto the axle ㉘.
12) Set the LOAD RACK ④ to the INITIAL mode position ㉚ with the LOAD GEAR T ⑨, and mount onto the two axles ㉛. Insert the CAM LOAD LEVER ASS'Y pin ㉝ into the hole ㉜.
13) Mount the two special washers ③ onto the two axles ㉛.
14) Mount the REINFORCE BRACKET ② with the three screws ①.
15) Insert the connector into the DRUM MOTOR board (SV-5).
16) Confirm that loading and unloading are performed smoothly.

Note : Be sure to perform INITIAL mode positioning of cams and gears precisely.

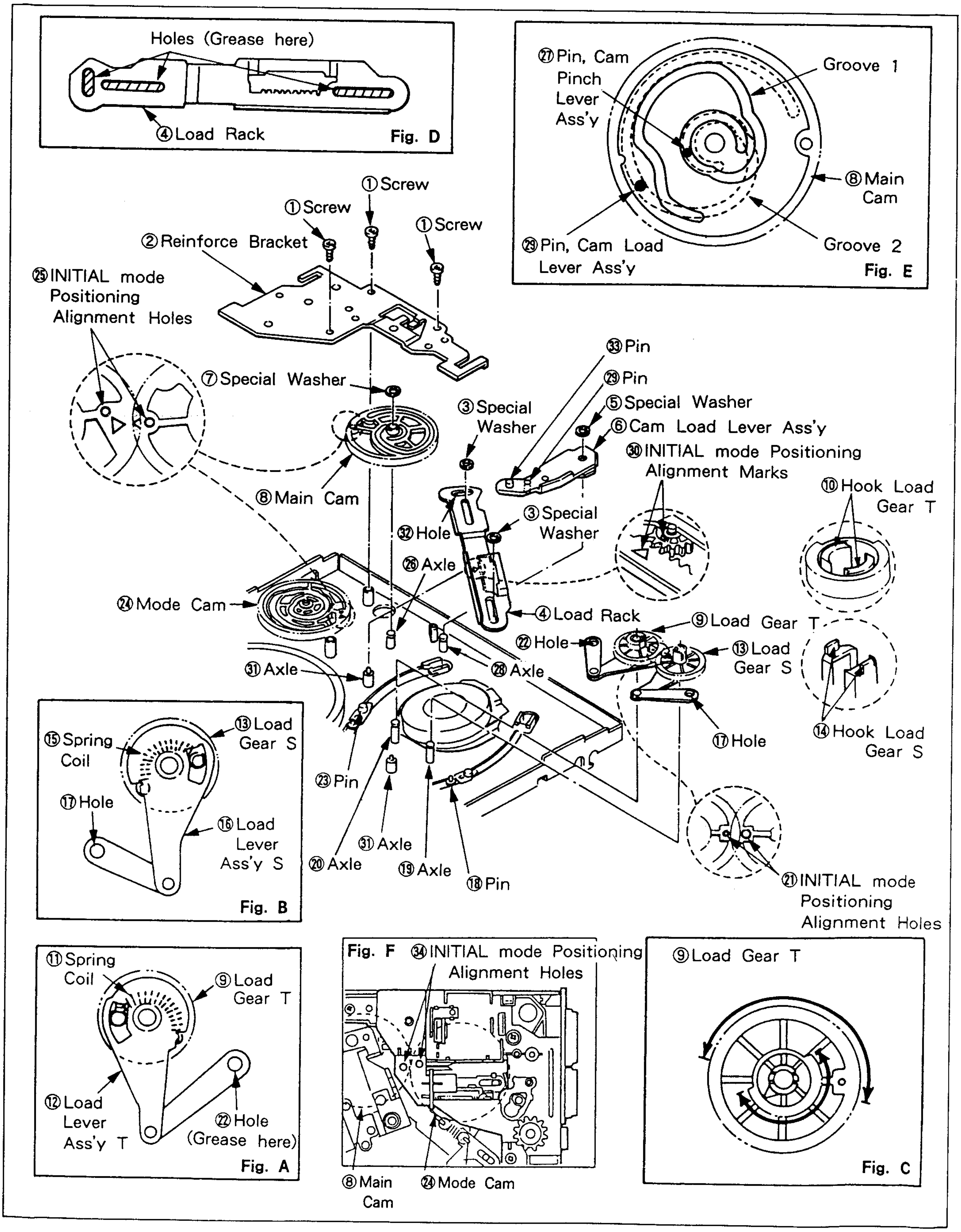

Holes (Grease here)
④Load Rack
Fig. D
㉗Pin, Cam Pinch Lever Ass'y
Groove 1
⑧Main Cam
㉙Pin, Cam Load Lever Ass'y
Groove 2
Fig. E
①Screw
①Screw
①Screw
②Reinforce Bracket
㉕INITIAL mode Positioning Alignment Holes
⑦Special Washer
⑧Main Cam
㉝Pin
㉙Pin
③Special Washer
⑤Special Washer
⑥Cam Load Lever Ass'y
㉚INITIAL mode Positioning Alignment Marks
⑩Hook Load Gear T
㉜Hole
③Special Washer
㉖Axle
㉔Mode Cam
④Load Rack
⑨Load Gear T
㉒Hole
⑬Load Gear S
㉘Axle
㉛Axle
⑰Hole
⑭Hook Load Gear S
⑮Spring Coil
⑬Load Gear S
⑰Hole
⑯Load Lever Ass'y S
Fig. B
㉓Pin
㉛Axle
⑳Axle
⑲Axle
⑱Pin
㉑INITIAL mode Positioning Alignment Holes
⑪Spring Coil
⑨Load Gear T
⑫Load Lever Ass'y T
㉒Hole (Grease here)
Fig. A
Fig. F
㉞INITIAL mode Positioning Alignment Holes
⑧Main Cam
㉔Mode Cam
⑨Load Gear T
Fig. C

Fig. 5-4-1. Loading Mechanism Main Parts

5-4-2. Mode Cam (See Fig. 5-4-2.)

1. Removal

1) Set the INITIAL mode with the mode selector (VHJ-0050).
2) Remove the REINFORCE BRACKET as instructed in 5-4-1.
3) Remove the two stop washers ①, then remove the CAM PLATE SLIDE ASS'Y ②.
4) Remove the MODE CAM ③.

2. Remounting

1) Referring to 5-4-1., confirm that the MAIN CAM is in the INITIAL mode position.
2) In case the MAIN CAM is misplaced, use the mode selector (VHJ-0050) to align the MAIN CAM positioning hole with the chassis INITIAL mode position hole (refer to 5-4-1. for the INITIAL mode position). Since the ROTARY SWITCH (mode detector switch) does not rotate, the mode selector indicator lamp will not show the correct mode.
3) Align the ROTARY SWITCH (mode detector switch) ④ with the INITIAL mode position mark ⑤ as shown in Fig. A.
4) Mount the MODE CAM ③ onto the axle ⑥. Do it so that the SLIDE CAM ASS'Y pin ⑪ is placed in the GROOVE 3 as shown in Fig. B.
5) Mount the CAM PLATE SLIDE ASS'Y ② onto the axles ⑥ and ⑦. Do it so that the pin ⑧ gets into the GROOVE 4 of the MODE CAM as shown in Fig. B, and the point ⑨ of the bent-up part into the ACT PLATE SLIDE ASS'Y hole ⑩.
6) Mount the two special washers ① onto the axles ⑥ and ⑦.
7) Mount the REINFORCE BRACKET as instructed in 5-4-1.

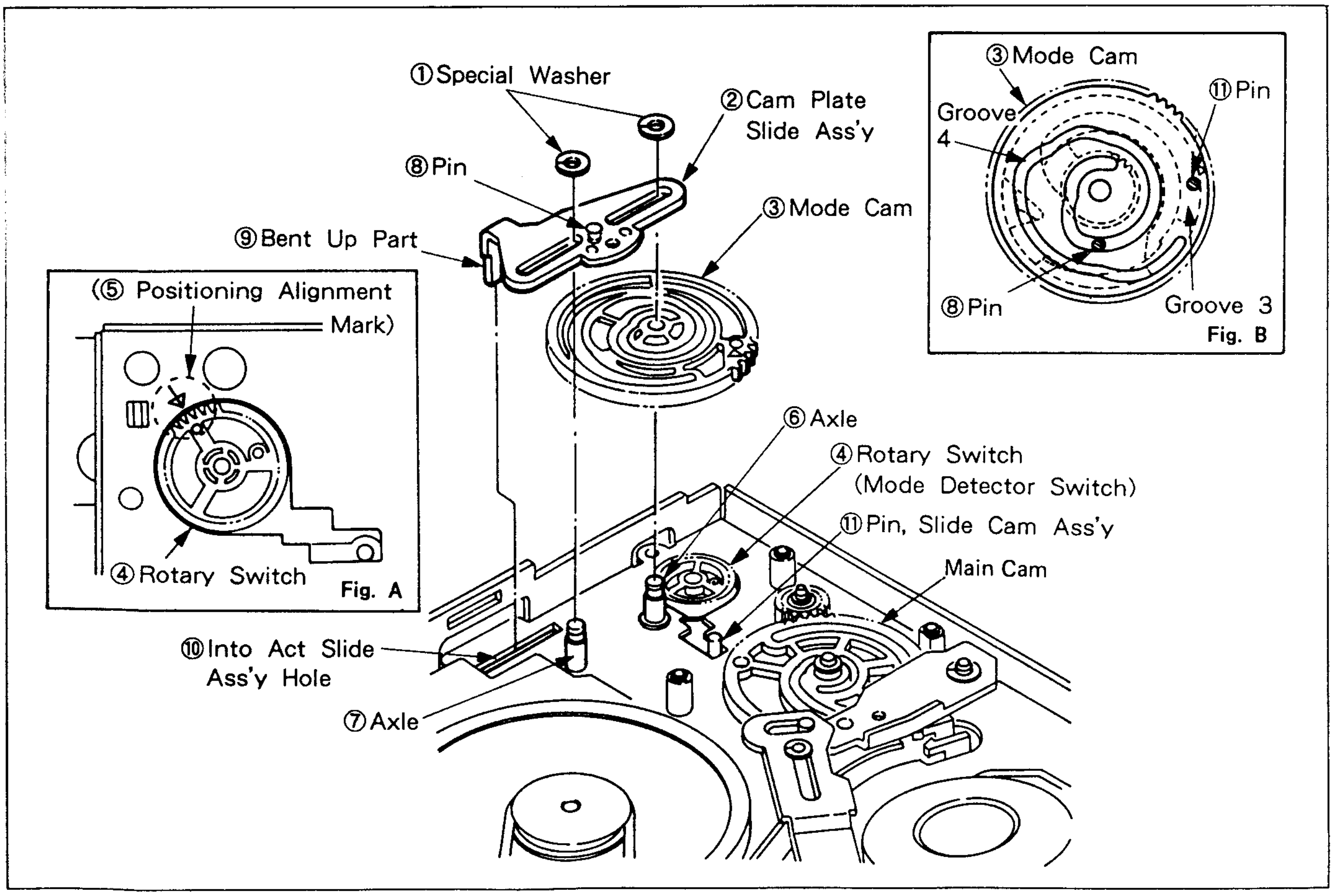

①Special Washer
②Cam Plate Slide Ass'y
⑧Pin
③Mode Cam
⑨Bent Up Part
(⑤ Positioning Alignment Mark)
④Rotary Switch
Fig. A
⑩Into Act Slide Ass'y Hole
⑦Axle
⑥Axle
④Rotary Switch (Mode Detector Switch)
⑪Pin, Slide Cam Ass'y
Main Cam
③Mode Cam
⑪Pin
Groove 4
⑧Pin
Groove 3
Fig. B

Fig. 5-4-2. Mode Cam

5-5. COMPL HEAD BRACKET (ACE HEAD) (See Fig. 5-5-1.)

1. **Removal**

1) Remove the COMPL HEAD BRACKET special mounting nut ②.
2) Remove the SLEEVE ③, the COMPL HEAD BRACKET ① and the ACE HEAD SPRING COIL ④, in that order.

Note : Take care not to scratch or soil the ACE head surface.

2. **Remounting**

1) Apply grease to the axle ⑥ as shown in Fig. A.
2) Apply grease to the spot where the COMPL HEAD BRACKET ① makes contact with the STOPPER ⑦ (See Fig. A).
3) Mount the ACE HEAD SPRING COIL ④ and the COMPL HEAD BRACKET ①, in that order, onto the axle ⑥. Hook one end of the ACE HEAD SPRING COIL ④ to the notch ⑤, and the other end to the COMPL HEAD BRACKET, so that the COMPL HEAD BRACKET is pressed against the STOPPER ⑦ (See Fig. A).
4) Mount the SPECIAL NUT ② onto the axle ⑥ through the SLEEVE ③.
5) Clean the ACE head surface with a chamois leather moistened with methyl alcohol.
6) Perform ACE head adjustment as instructed in 6-4.

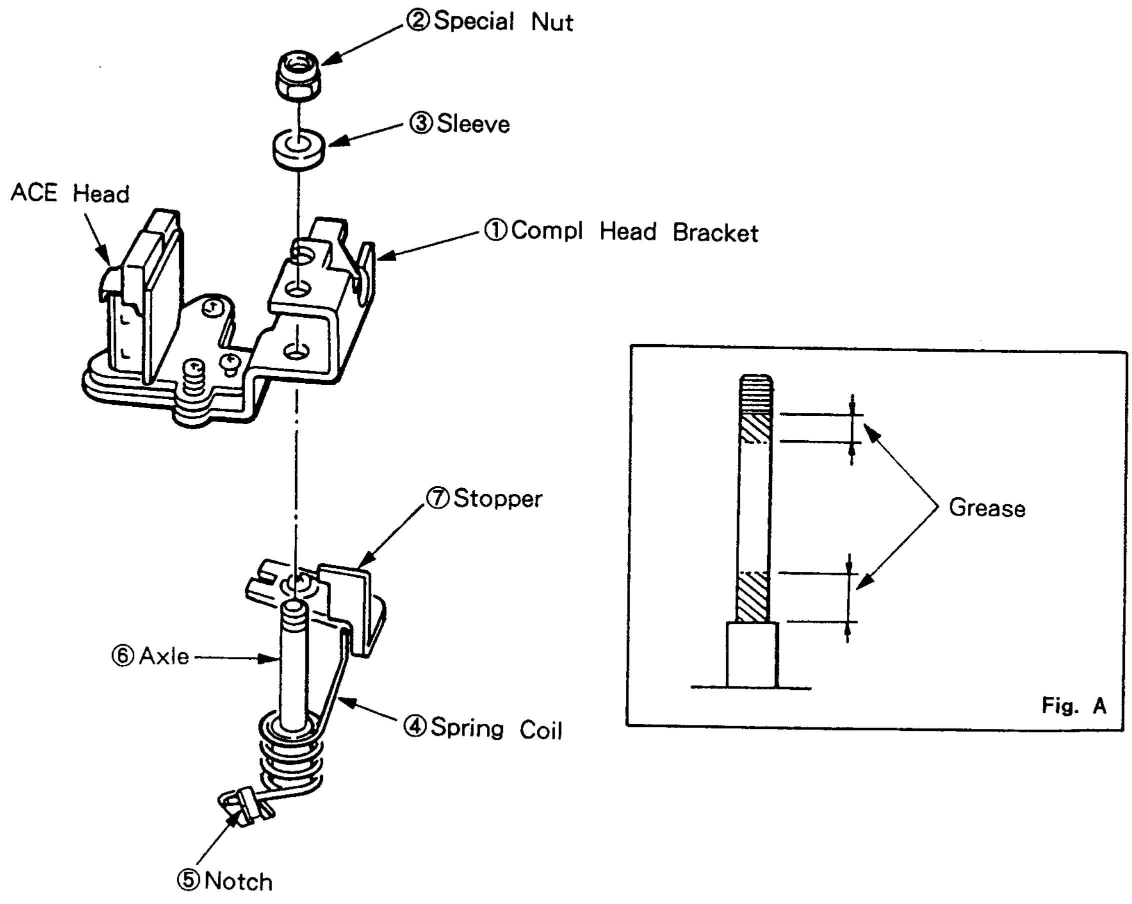

②Special Nut
③Sleeve
ACE Head
①Compl Head Bracket
⑦Stopper
⑥Axle
④Spring Coil
⑤Notch
Grease
Fig. A

Fig. 5-5-1. Compl Head Bracket (ACE Head)

5-6. PINCH ROLLER PRESSURE MECHANISM (See Fig. 5-6-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the COMPL HEAD BRACKET as instructed in 5-5.
3) Remove the PINCH SPRING COIL ①.
4) Remove the special washer ②, then remove the PINCH LEVER ASS'Y ③.
5) Remove the REV GUIDE LEVER SPRING COIL ④.
6) Remove the REV GUIDE LEVER ASS'Y ⑥ from the hook ⑤ of the plastic molding bearing on the bottom side. Use a jig VHJ-0073 shown in Fig. 5-6-2 to widen the hook ⑤ of the plastic molding bearing. By so doing, the above removal of the REV GUIDE LEVER ASS'Y ⑥ can be made more easily. Care should be taken to avoid pushing the jig VHJ-0073 too much. Pushing it too hard may damage the hook in an extreme case.
7) Remove the LINK LOCK SPRING COIL ⑦.
8) Remove the special washer ⑧, then remove the PINCH CAM LEVER ASS'Y ⑨.
9) Remove the ACT PINCH SLIDE ASS'Y ⑩.

Note : If damaged the claw ⑤ of the plastic bearing, reference should be made to Section 3. "Method of Repairing the Bearing Section of REV GUIDE LEVER ASSEMBLY".

2. Remounting

1) Apply grease to pins ⑫/⑬ and axles ⑯/⑱.
2) Apply grease to the ACT PINCH SLIDE ASS'Y pin ⑰.
3) Set the INITIAL mode with the mode selector (VHJ-0050).
4) Mount the ACT PINCH SLIDE ASS'Y ⑩ onto pins ⑫ and ⑬.
5) Insert the pin ⑭ of the PINCH CAM LEVER ASS'Y ⑨ into the MAIN CAM ⑪ GROOVE 1, and mount onto the axle ⑯ while inserting the pin ⑰ of the ACT PINCH SLIDE ASS'Y into the hole ⑮.
6) Mount the special washer ⑧ onto the axle ⑯.
7) Hook the LINK LOCK SPRING COIL ⑦ to the PINCH CAM LEVER ASS'Y ⑨.
8) Mount the REV GUIDE LEVER ASS'Y ⑥ to the plastic molding bearing, then fix it with the hook ⑤ at the bottom.
9) Hook the REV GUIDE LEVER SPRING COIL ④.
10) Mount the PINCH LEVER ASS'Y ③ to the axle ⑱.
11) Mount the special washer ② to the axle ⑱.
12) Hook the PINCH SPRING COIL ① between the ACT PINCH SLIDE ASS'Y ⑩ and the PINCH LEVER ASS'Y ③.
13) Mount the COMPL HEAD BRACKET as instructed in 5-5.
14) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
15) Perform ACE head adjustment as instructed in 6-4.

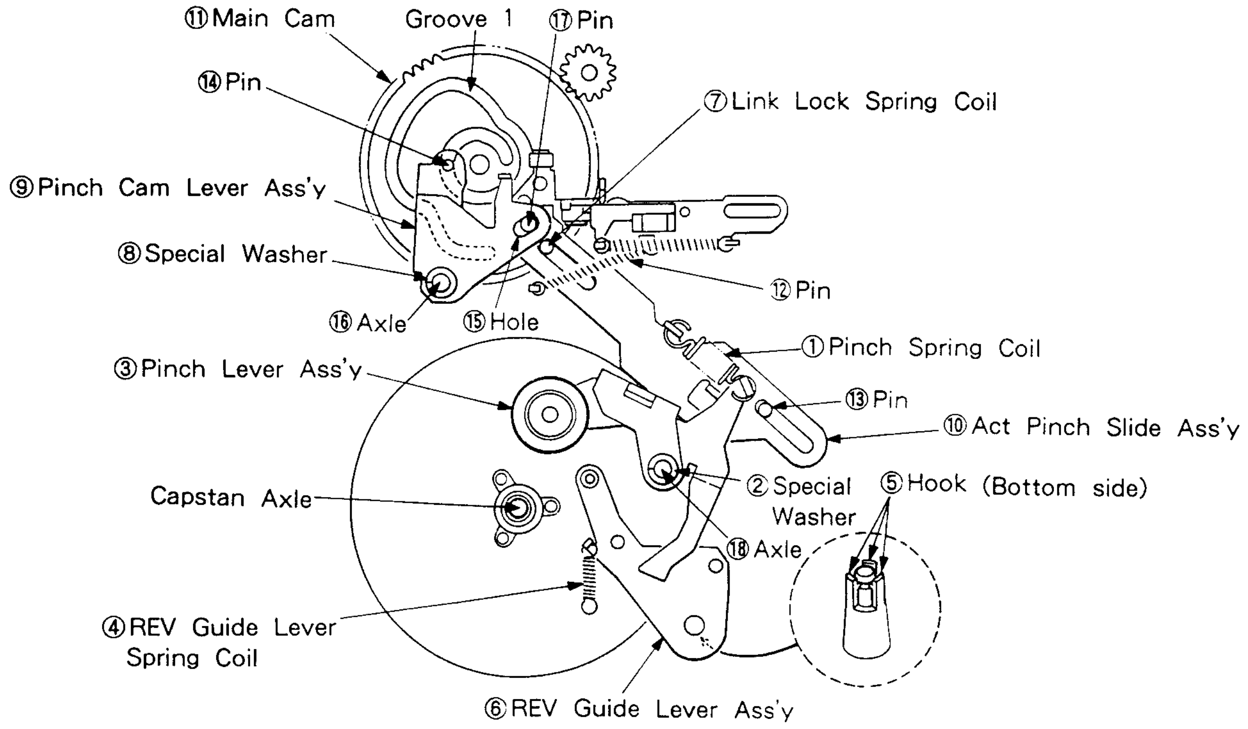
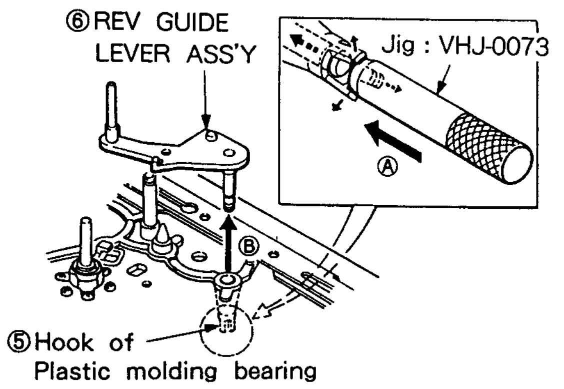

⑪Main Cam
Groove 1
⑰Pin
⑭Pin
⑦Link Lock Spring Coil
⑨Pinch Cam Lever Ass'y
⑧Special Washer
⑫Pin
⑯Axle
⑮Hole
①Pinch Spring Coil
③Pinch Lever Ass'y
⑬Pin
⑩Act Pinch Slide Ass'y
Capstan Axle
②Special Washer
⑤Hook (Bottom side)
⑱Axle
④REV Guide Lever Spring Coil
⑥REV Guide Lever Ass'y

Fig. 5-6-1. Pinch Roller Pressing Mechanism


⑥REV GUIDE LEVER ASS'Y
Jig : VHJ-0073
Ⓐ
Ⓑ
⑤Hook of Plastic molding bearing

Remove REV GUIDE LEVER ASS'Y in the direction of arrow Ⓑ, pushing VHJ-0073 slightly in the direction of arrow Ⓐ.
Be careful not to damage the hook by pushing too much.

Fig. 5-6-2 Method of Using the Jig VHJ-0073

3. Method of Repairing the Bearing Section of REV GUIDE LEVER ASS'Y

If the hook of the plastic molding bearing is damaged in the process of removing the REV GUIDE LEVER ASS'Y, proceed with the repair as follows :

1) Scrape the broken hook of the bearing section with a cutter knife and flatten it.
2) Insert the REV GUIDE LEVER ASS'Y in the bearing and fit a stopper washer in. The special washer to be used must be Part No. 411 109 1605. This stop washer (Part No. 411 109 1605) is the same as that used on SUPPLY REEL ASS'Y or TAKE-UP REEL ASS'Y.
   Remove the REV GUIDE LEVER ASS'Y toward an arrow B while pushing the jig VHJ-0073 lightly in the direction of an arrow.

Pushing the jig VHJ-0073 too much may cause hook breakage. Therefore, care should be taken.

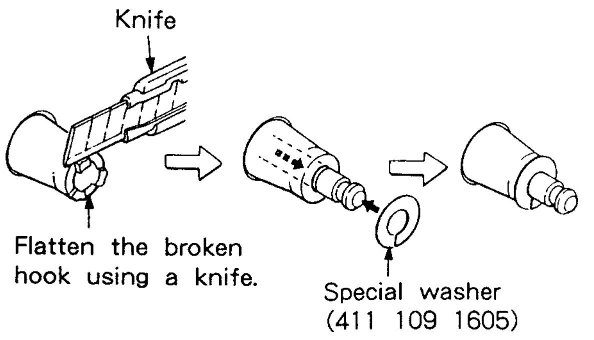

Knife
Flatten the broken hook using a knife.
Special washer (411 109 1605)

Fig. 5-6-3 Method of Repairing the Bearlnig Section of the REV GUIDE LEVER ASS'Y

5-7. BRAKE MECHANISM

5-7-1. Sub Take-up Brake Ass'y (See Fig. 5-7-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SPRING COIL ①.
3) While pushing the hook ② in the direction of arrow, remove the SUB TAKE-UP BRAKE ASS'Y ③.

2. Remounting

1) Mount the SUB TAKE-UP BRAKE ASS'Y ③ onto the pin ④. Confirm that the hook ② is firmly hooked to the chassis.
2) Fit the SPRING COIL between hooks ⑤ and ⑥.
3) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

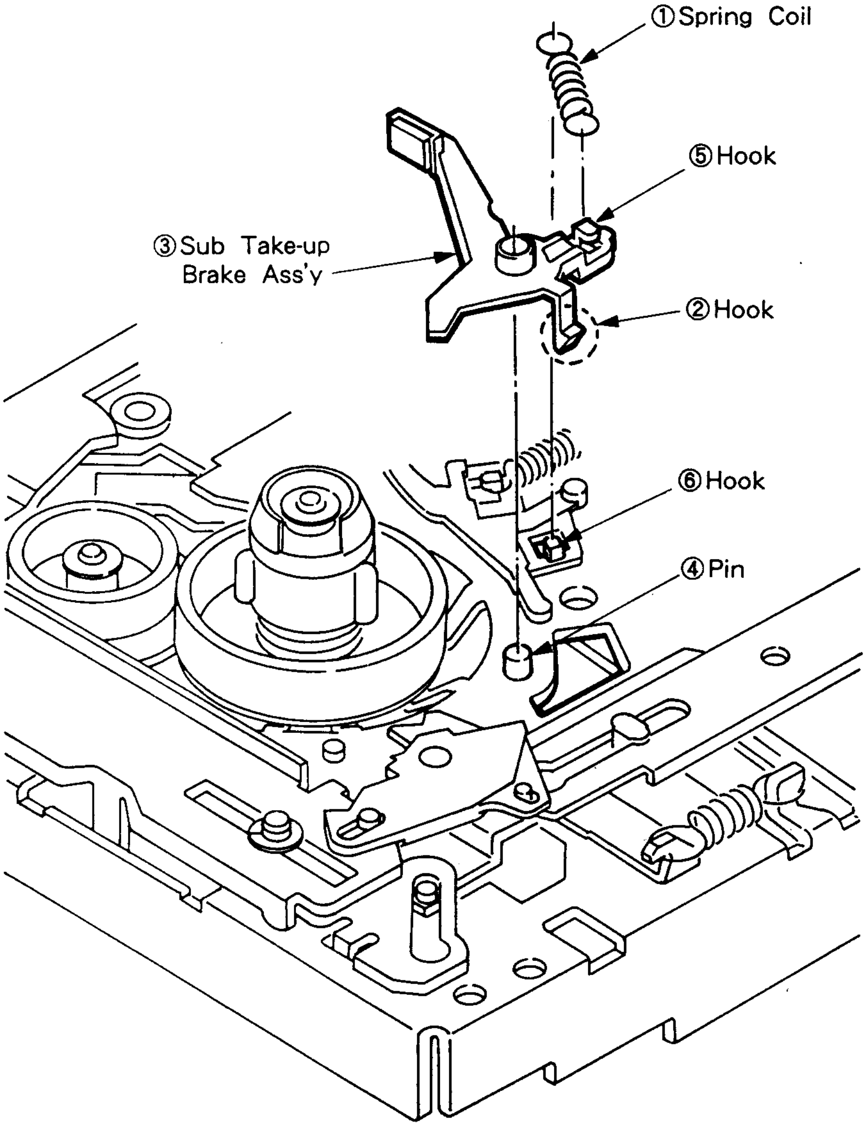

①Spring Coil
⑤Hook
③Sub Take-up Brake Ass'y
②Hook
⑥Hook
④Pin

Fig. 5-7-1. Sub Take-up Brake Ass'y

5-7-2. Supply Brake Ass'y and Take-up Brake Ass'y (See Fig. 5-7-2.)

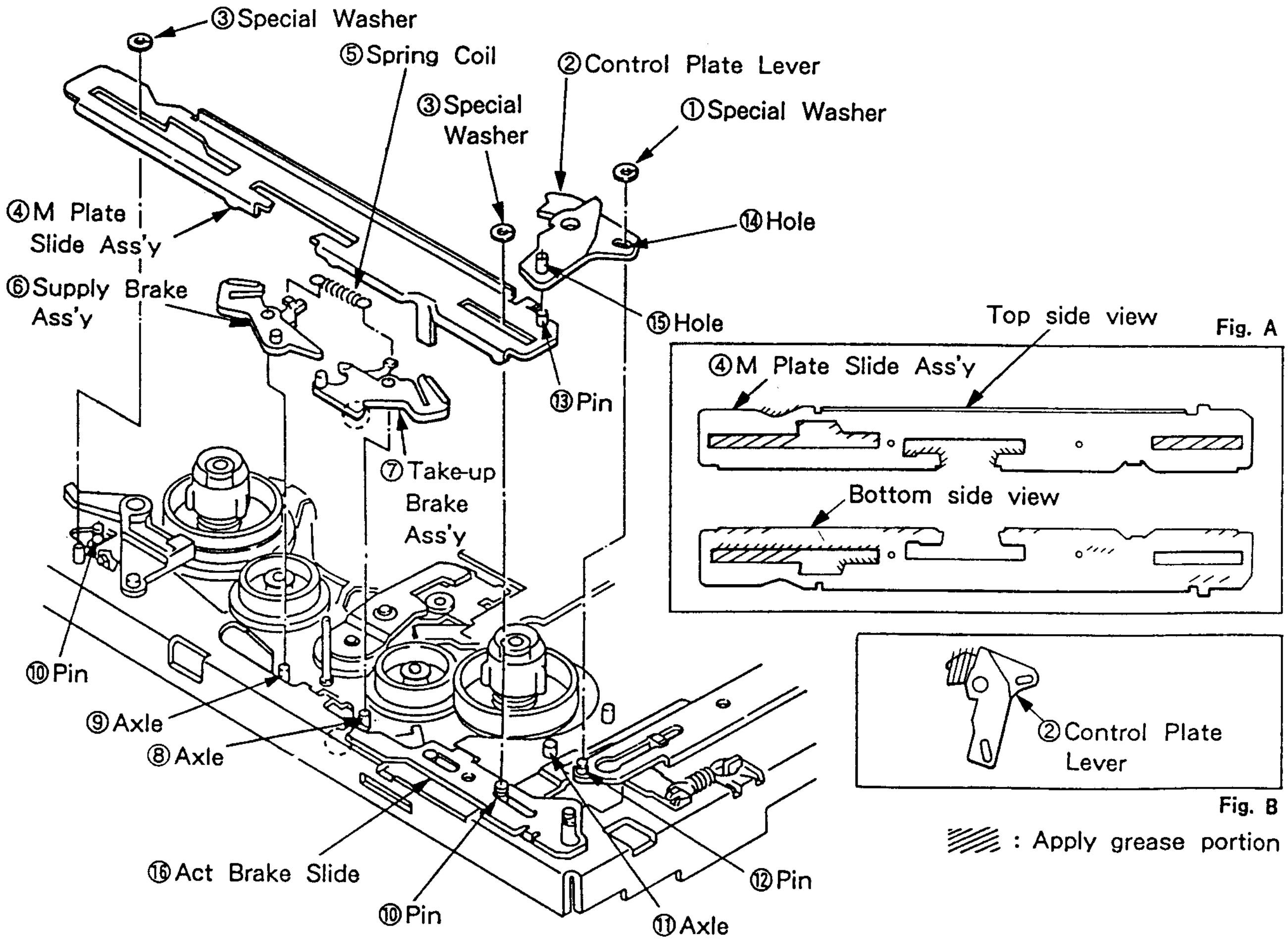
1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SUB TAKE-UP BRAKE as instructed in 5-7-1.
3) Remove the special washer ①, then remove the CONTROL PLATE LEVER ②.
4) Remove the two special washers ③, then remove the M PLATE SLIDE ASS'Y ④.
5) Remove the SPRING COIL ⑤.
6) Remove the SUPPLY BRAKE ASS'Y ⑥ and the TAKE-UP BRAKE ASS'Y ⑦.

Note : Take care not to soil the brake shoes.

2. Remounting

1) Apply a thin layer of grease to axles ⑧ and ⑨.
2) Mount the TAKE-UP BRAKE ASS'Y ⑦ onto the axle ⑧.
3) Mount the SUPPLY BRAKE ASS'Y ⑥ onto the axle ⑨.
4) After applying a thin layer of grease to the M PLATE SLIDE ASS'Y ④ as shown in Fig. A, mount it onto the two pins ⑩.
5) Mount the two special washers ③ onto the two pins ⑩.
6) After applying grease to the CONTROL PLATE LEVER ② as shown in Fig. B, mount it onto the axle ⑪. Insert the ACT PLATE SLIDE ASS'Y pin ⑫ into the hole ⑭, and the M PLATE SLIDE ASS'Y pin ⑬ into the hole ⑮.
7) Mount the special washer ① onto the pin ⑫.
8) Mount the SUB TAKE-UP BRAKE as instructed in 5-7-1.
9) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.


③Special Washer
⑤Spring Coil
②Control Plate Lever
③Special Washer
①Special Washer
⑭Hole
④M Plate Slide Ass'y
⑥Supply Brake Ass'y
⑮Hole
⑬Pin
⑦Take-up Brake Ass'y
⑩Pin
⑨Axle
⑧Axle
⑯Act Brake Slide
⑩Pin
⑫Pin
⑪Axle
Top side view
Fig. A
④M Plate Slide Ass'y
Bottom side view
②Control Plate Lever
Fig. B
▨ : Apply grease portion

When assembling, the contact surfaces of Take-up Brake ⑦ and the Brake Slide ⑯ marked with ◌ should contact but not overlap each other.

Fig. 5-7-2. Supply Brake Ass'y & Take-up Brake Ass'y

5-7-3. Tension Lever Ass'y and Band Holder Ass'y (See Fig. 5-7-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the SPRING COIL ①.
3) Remove the screw ③ fixing the BAND HOLDER ASS'Y ②.
4) Push the SUB SUPPLY BRAKE ④ in the direction of the arrow A, setting the BAND HOLDER ASS'Y ② free.
5) Open the hook ⑤ a little and remove the TENSION LEVER ASS'Y ⑥. Take care not to open the hook ⑤ too much, otherwise it may be deformed or broken.
6) Remove the hook ⑦ of the BAND HOLDER ASS'Y.

2. Remounting

1) Mount the BAND HOLDER ASS'Y hook ⑦ into the TENSION LEVER ASS'Y hole ⑧.
2) Insert the TENSION LEVER ASS'Y axle ⑨ into the hole ⑩ and confirm that the hook ⑤ is hooked.
3) While pushing the SUB SUPPLY BRAKE ④ in the direction of arrow A, mount the BAND HOLDER ASS'Y ② with the screw ③.
4) Hook the SPRING COIL ① between the hooks ⑪ and ⑫.
5) Perform TENSION POLE position adjustment as instructed in 6-3.
6) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

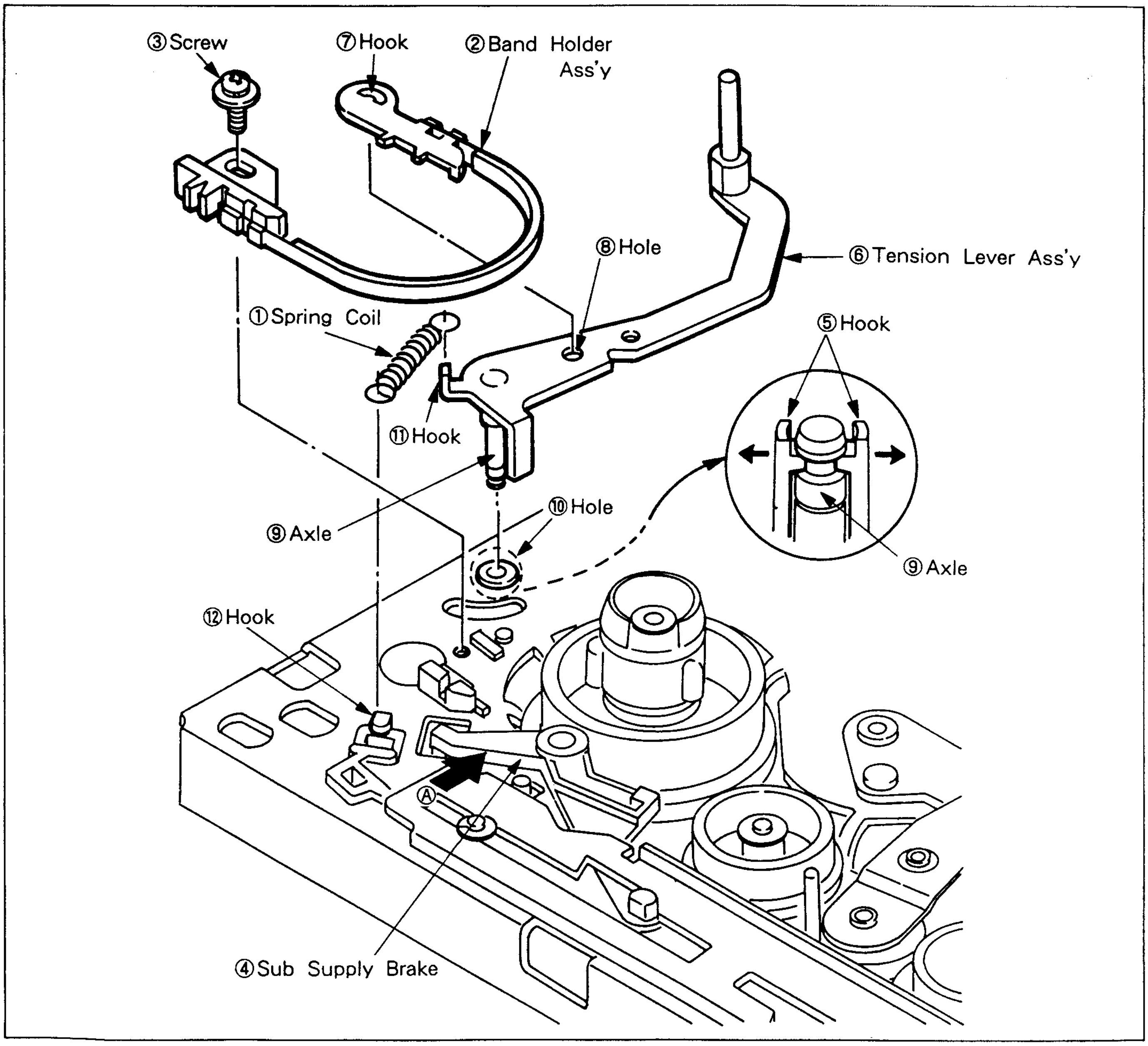

③Screw
⑦Hook
②Band Holder Ass'y
⑧Hole
⑥Tension Lever Ass'y
①Spring Coil
⑤Hook
⑪Hook
⑩Hole
⑨Axle
⑨Axle
⑫Hook
Ⓐ
④Sub Supply Brake

Fig. 5-7-3. Tension Lever Ass'y & Band Holder Ass'y

5-7-4. Capstan Brake Ass'y (See Fig. 5-7-4.)

1. Removal

1) Remove the SPRING COIL ①.
2) Unhook the hook ②, then remove the CAPSTAN BRAKE ASS'Y ③.

2. Remounting

1) Mount the CAPSTAN BRAKE ASS'Y ③ onto the axle ④. Confirm that the hook ② is hooked to the chassis.
2) Hook the SPRING COIL ① between hooks ⑤ and ⑥. Fix the hook ⑥ side with adhesive (use an adhesive that allows later detaching).

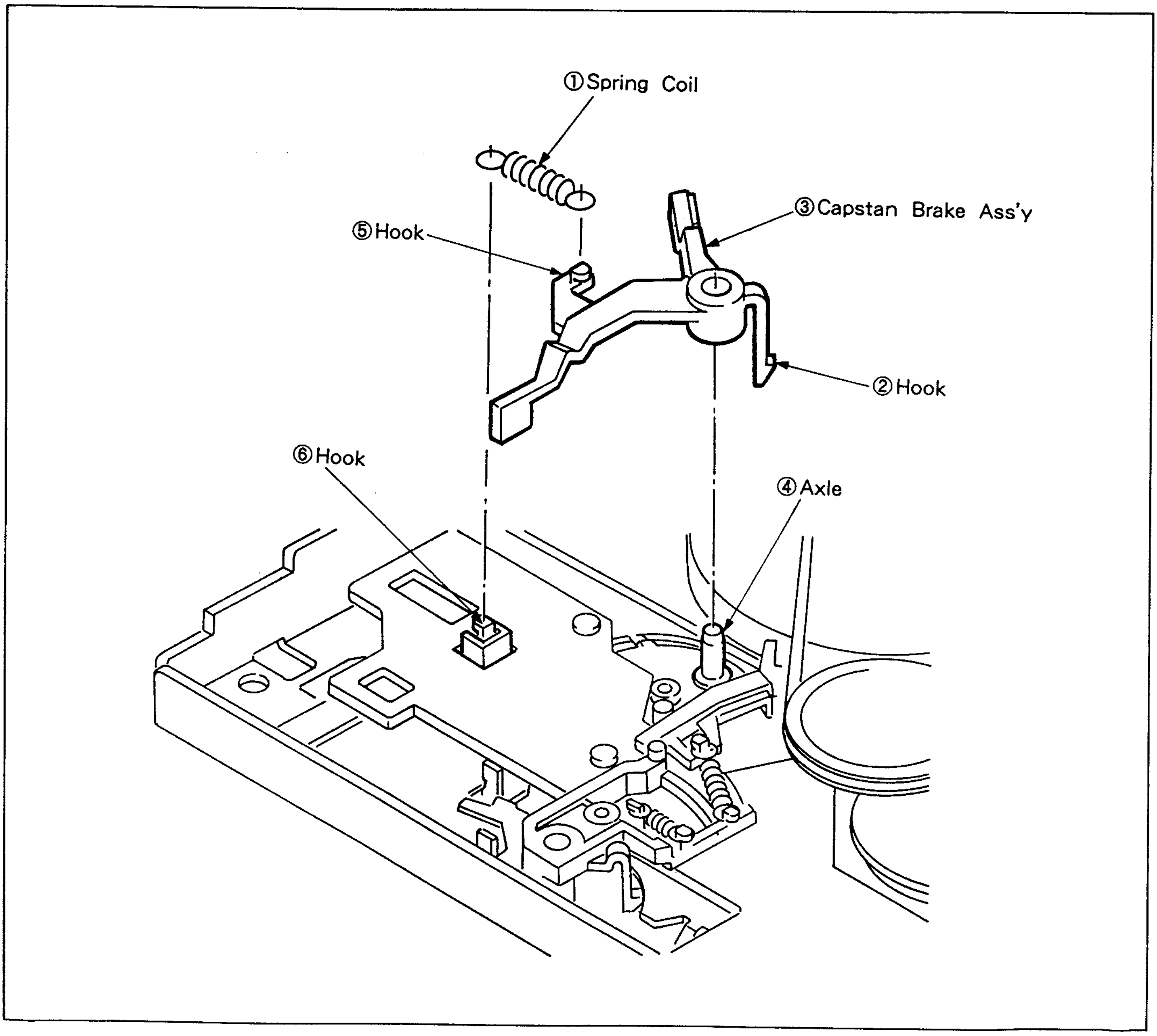

①Spring Coil
③Capstan Brake Ass'y
⑤Hook
②Hook
⑥Hook
④Axle

Fig. 5-7-4. Capstan Brake Ass'y

5-8. REEL TABLE DRIVE MECHANISM

5-8-1. Supply Reel Ass'y and Supply Reel Gear (See Fig. 5-8-1.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the BAND HOLDER ASS'Y as instructed in 5-7-3.
3) Set the PLAY mode with the mode selector (VHJ-0050).
4) Remove the special washer ①, then remove the SUPPLY REEL ASS'Y ② and the washer ③.
5) Remove the special washer ④.
6) While pushing the SUPPLY BRAKE ASS'Y ⑤ in the direction of arrow A, remove the SUPPLY REEL GEAR ⑥ and the washer ⑦.

Note : Be sure that no dirt gets on the section where both brake shoes make contact.

2. Remounting

1) Apply a little oil (less than one drop) to the part of the axle ⑧ indicated by the arrow B, then mount the washer ⑦.
2) While pushing the SUPPLY BRAKE ASS'Y ⑤ in the direction of arrow A, mount the SUPPLY REEL GEAR ⑥ onto the axle ⑧.
3) Mount the special washer ④ to the axle ⑧.
4) Apply 1 drop of oil to the part of the axle ⑨ indicated by the arrow C, then mount the washer ③.
5) Mount the SUPPLY REEL ASS'Y ② onto the axle ⑨.
6) Perform reel table height adjustment as instructed in 6-2-1.
7) Mount the special washer ① onto the axle ⑨.
8) Mount the BAND HOLDER ASS'Y as instructed in 5-7-3.
9) Perform tension pole position adjustment as instructed in 6-3.
10) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

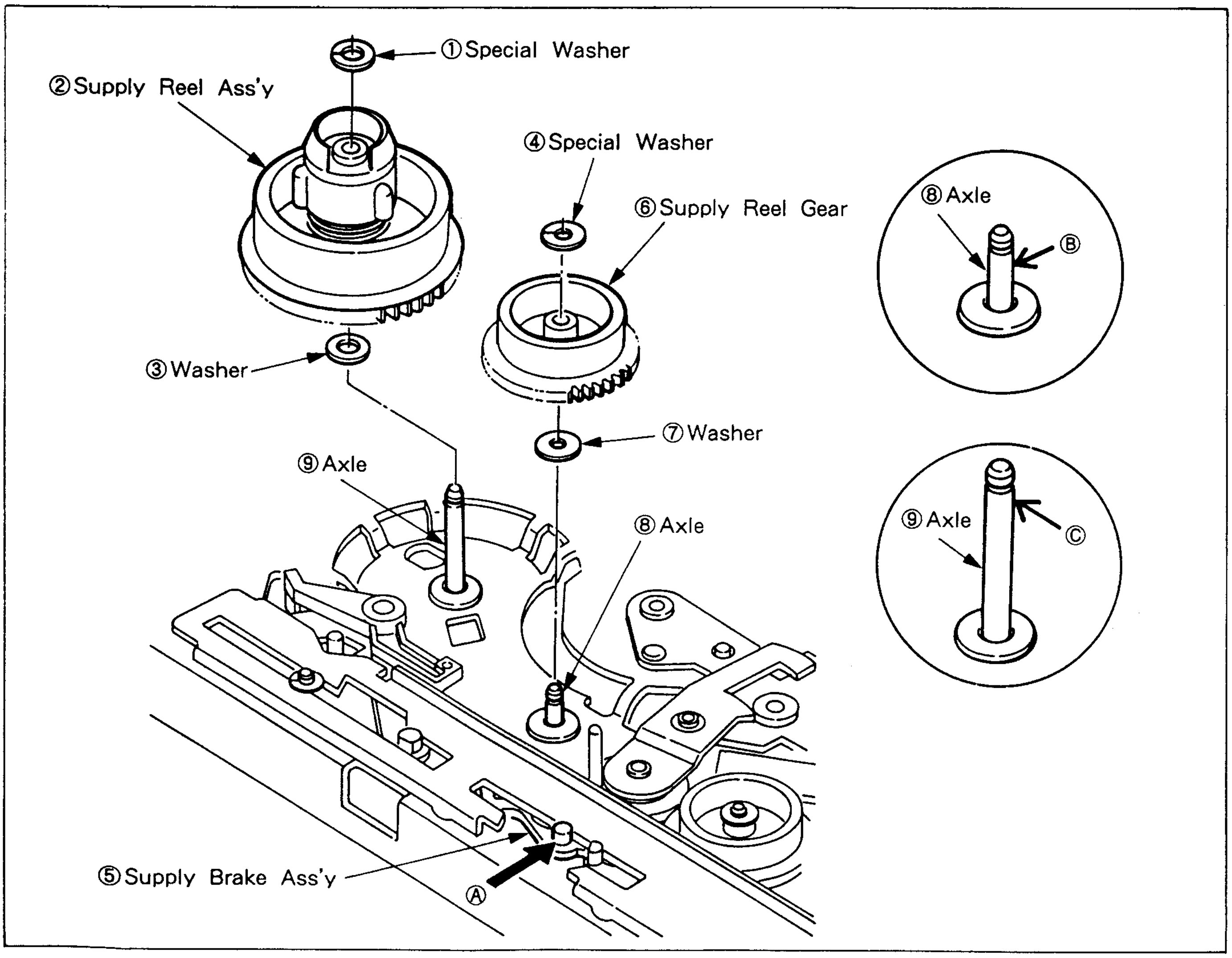


Fig. 5-8-1. Supply Reel Ass'y & Supply Reel Gear

5-8-2. Take-up Reel Ass'y (See Fig. 5-8-2.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the special washer ①.
3) Push the SUB TAKE-UP BRAKE ASS'Y ② in the direction of arrow A to release the brake, then remove the TAKE-UP REEL ASS'Y ③ and the washer ④.

Note : Be sure that no dirt gets on the section where both brake shoes make contact.

2. Remounting

1) Apply 1 drop of oil to the part of the axle ⑤ indicated by the arrow B, then mount the washer ④.
2) While pushing the SUB TAKE-UP BRAKE ASS'Y ② in the direction of arrow A, mount the TAKE-UP REEL ASS'Y ③ onto the axle ⑤.
3) Perform reel table height adjustment as instructed in 6-2.
4) Mount the special washer ① onto the axle ⑤.
5) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

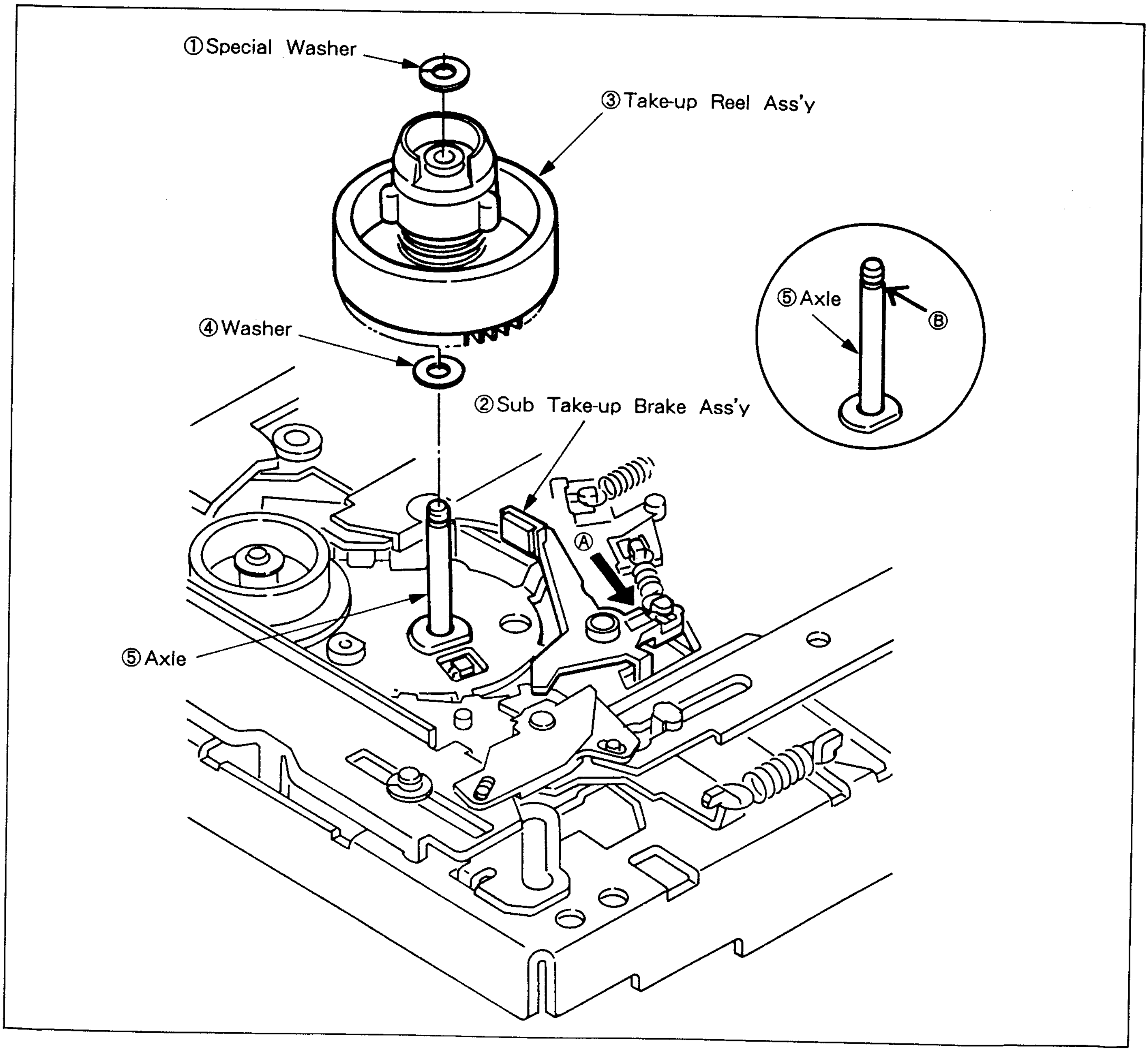


Fig. 5-8-2. Take-up Reel Ass'y

5-8-3. Take-up Reel Gear (See Fig. 5-8-3.)

1. Removal

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the TAKE-UP REEL ASS'Y as instructed in 5-8-2.
3) Remove the SUB TAKE-UP BRAKE ASS'Y as instructed in 5-7-1.
4) Remove the TAKE-UP BRAKE ASS'Y as instructed in 5-7-2.
5) Remove the special washer ①, then remove the TAKE-UP REEL GEAR ③ and the washer ④.

2. Remounting

1) Apply a little oil (less than one drop) to the part of the axle ⑤ indicated with an arrow.
2) Mount the washer ④ and the TAKE-UP REEL GEAR ③ onto the axle ⑤.
3) Mount the special washer ① onto the axle ⑤.
4) Mount the TAKE-UP BRAKE ASS'Y as instructed in 5-7-2.
5) Mount the SUB TAKE-UP BRAKE ASS'Y as instructed in 5-7-1.
6) Mount the TAKE-UP REEL ASS'Y as instructed in 5-8-2.
7) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

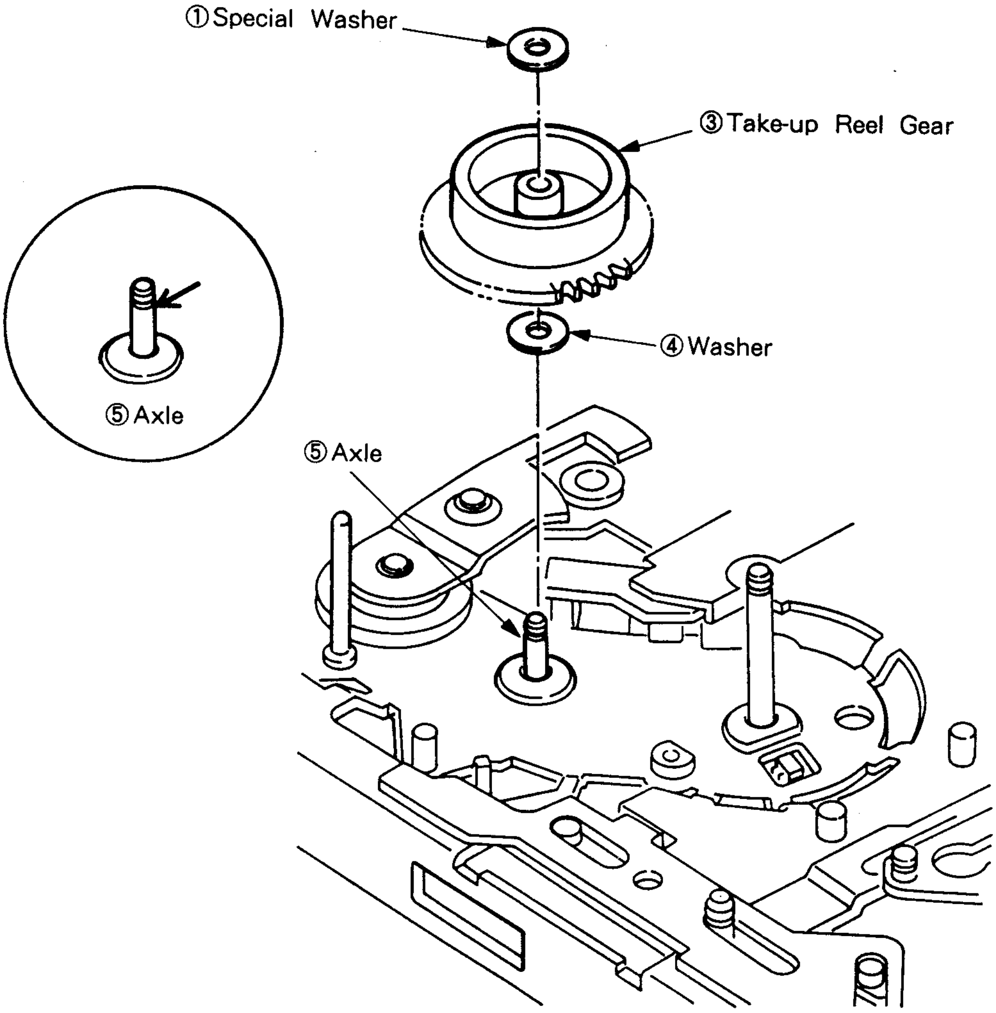


Fig. 5-8-3. TaKe-up Reel Gear

5-8-4. Reel Pulley and Friction Gear Ass'y (See Fig. 5-8-4.)

1. Removal

1) Remove the two screws ①, then remove the PULLEY BRACKET ②.
2) Remove the REEL DRIVE BELT ③.
3) Remove the special washer ④, then remove the REEL PULLEY ⑤.
4) Remove the special washer ⑥, then remove the FRICTION GEAR ASS'Y ⑦ and the washer ⑧.

Note : Some model are not mounted the pulley bracket ②. The washer ⑫ is mounted on the pin ⑪ with a screw ①, and serves as the PULLEY BRACKET ②.

2. Remounting

1) Apply one drop of oil to the parts of axles ⑨ and ⑩ indicated with an arrow.
2) Mount the washer ⑧ and the FRICTION GEAR ASS'Y ⑦ onto the axle ⑨.
3) Mount the special washer ⑥ onto the axle ⑨.
4) Mount the REEL PULLEY ⑤ onto the axle ⑩.
5) Mount the special washer ④ onto the axle ⑩.
6) Set the REEL DRIVE BELT ③.
7) Mount the PULLEY BRACKET ② with the two screws ①.

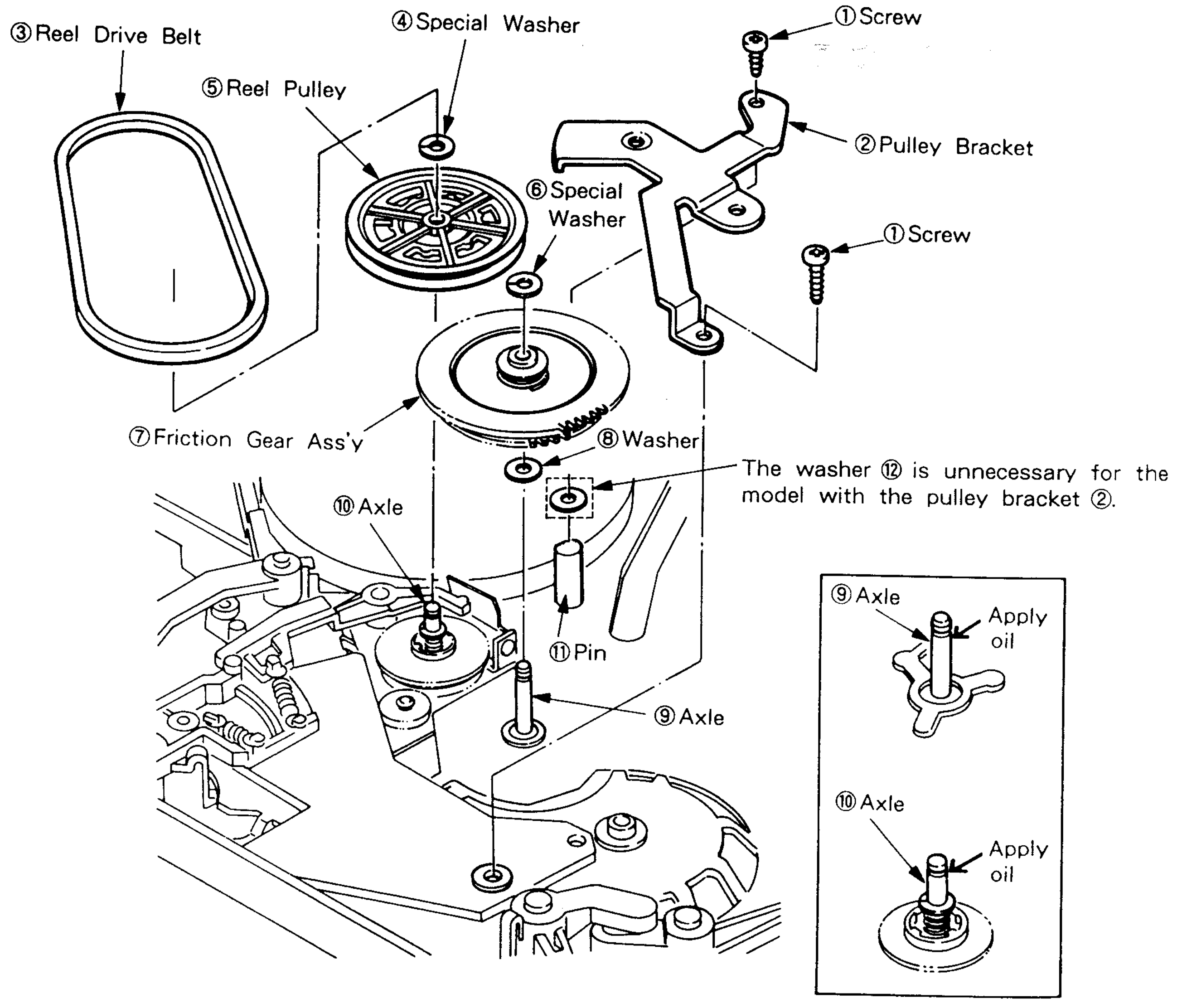

③Reel Drive Belt
④Special Washer
①Screw
⑤Reel Pulley
②Pulley Bracket
⑥Special Washer
①Screw
⑦Friction Gear Ass'y
⑧Washer
The washer ⑫ is unnecessary for the model with the pulley bracket ②.
⑩Axle
⑪Pin
⑨Axle
⑨Axle
Apply oil
⑩Axle
Apply oil

Fig. 2-8-4. Reel Pulley & Friction Gear

5-8-5. COMPL Clutch (See Fig. 5-8-5.)

1. **Removal**

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Remove the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
3) Remove the screw ①, then remove the COMPL MC-4 ②.
4) Remove the two screws ③, then remove the COMPL CLUTCH ④.

2. **Remounting**

1) Mount the COMPL CLUTCH ④ with the two screws ③, aligning it with the protuberance ⑤.
2) After inserting the CN831 (COMPL MC-4) into the CN801 (COMPL MC-1), mount the COMPL MC-4 with the screw ①.
3) Mount the REEL PULLEY, the REEL DRIVE BELT and the PULLEY BRACKET as instructed in 5-8-4.
4) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

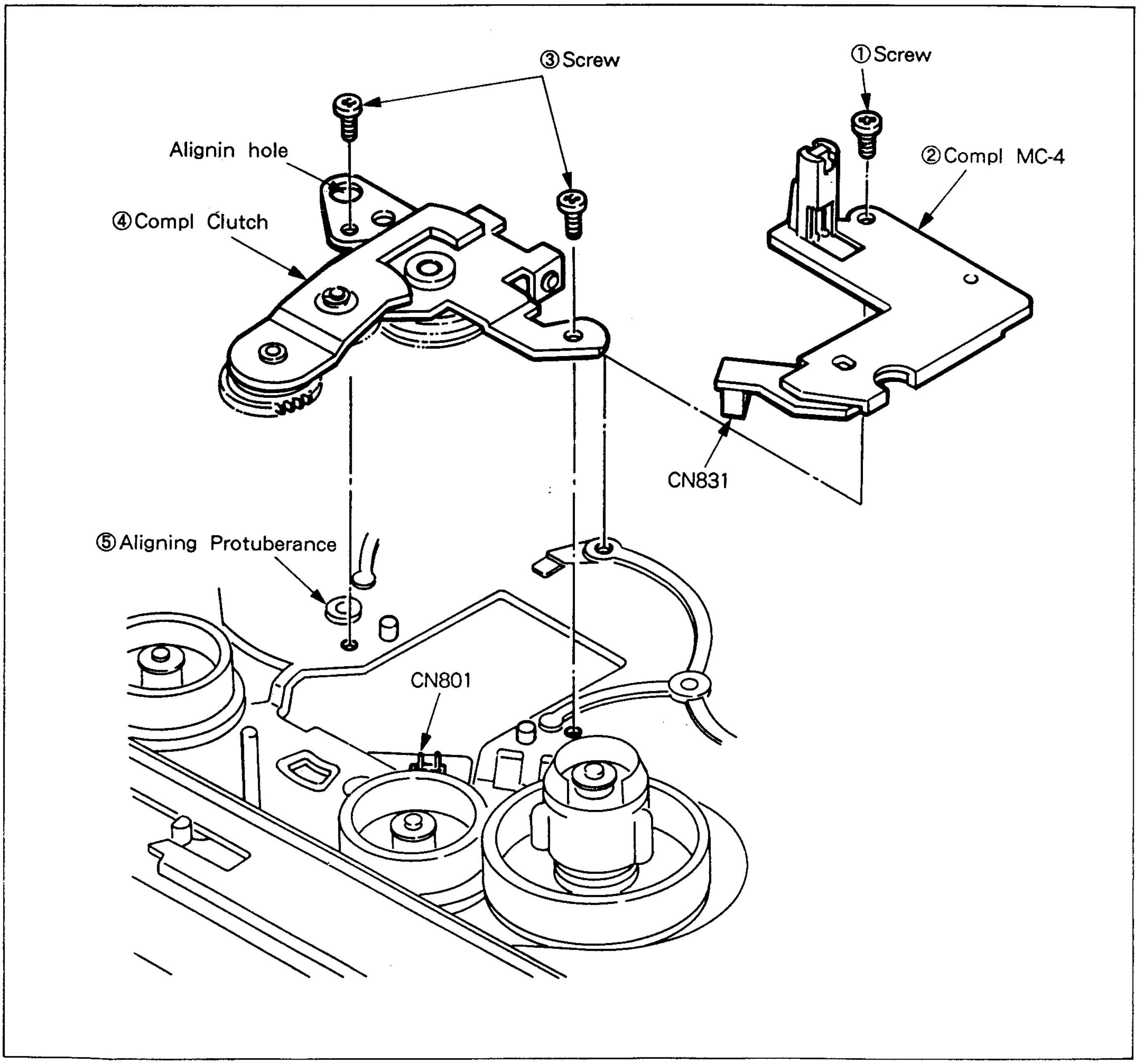

③Screw
①Screw
Alignin hole
②Compl MC-4
④Compl Clutch
CN831
⑤Aligning Protuberance
CN801

Fig. 5-8-5. Compl Clutch

5-8-6. Clutch Change Lever and Clutch Lever Ass'y (See Fig. 5-8-6.)

1. Removal

1) Remove the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.
2) Remove the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
3) Remove the SPRING COIL ①.
4) Unhook the hook ②, then remove the CLUTCH CHANGE LEVER ③.
5) Unhook the hook ⑤, then remove the CLUTCH LEVER ASS'Y ⑥.

2. Remounting

1) Mount the CLUTCH LEVER ASS'Y ⑥ onto the axle ⑦. Confirm that the hook ⑤ is hooked to the chassis.
2) Mount the CLUTCH CHANGE LEVER ③ onto the axle ⑧. Confirm that the hook ② is hooked to the chassis.
3) Hook the SPRING COIL ① between the hooks ⑨ and ⑩.
4) Mount the PULLEY BRACKET, the REEL DRIVE BELT and the REEL PULLEY as instructed in 5-8-4.
5) Mount the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.

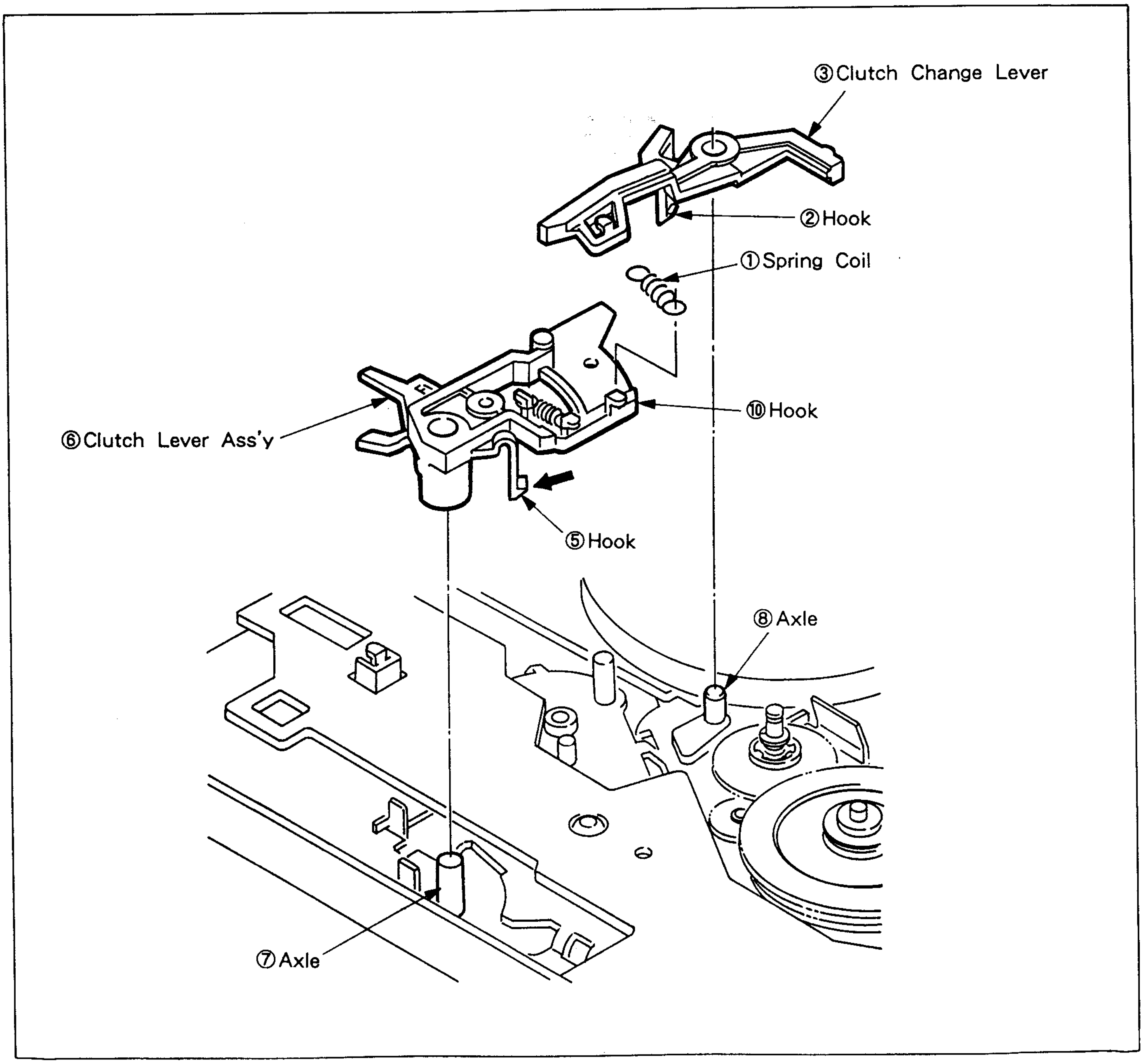


Fig. 5-8-6. Clutch Change Lever & Clutch Lever Ass'y

5-9. CAPSTAN MOTOR (See Fig. 5-9-1.)

1. Removal

1) Remove the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.
2) Remove the CAPSTAN MOTOR ⑥ connector.
3) Remove the REEL DRIVE BELT ② from the CAPSTAN MOTOR PULLEY ①.
4) Remove the two screws ④ fixing the COMPL CASSETTE MECHANISM TOP BOARD ③, then slide the TOP BOARD ③ backward.
5) Remove the three screws ⑤, then remove the CAPSTAN MOTOR ⑥.

Note : Take care not to scratch or soil the capstan axle.

2. Remounting

1) Mount the CAPSTAN MOTOR ⑥ with the three screws ⑤.
2) Connect the CAPSTAN MOTOR ⑥ connector.
3) Mount the TOP BOARD ③ with the two screws ④.
4) Fit the REEL DRIVE BELT ② around the CAPSTAN MOTOR PULLEY ① and the REEL PULLEY ⑦.
5) Mount the CAPSTAN BRAKE ASS'Y as instructed in 5-7-4.

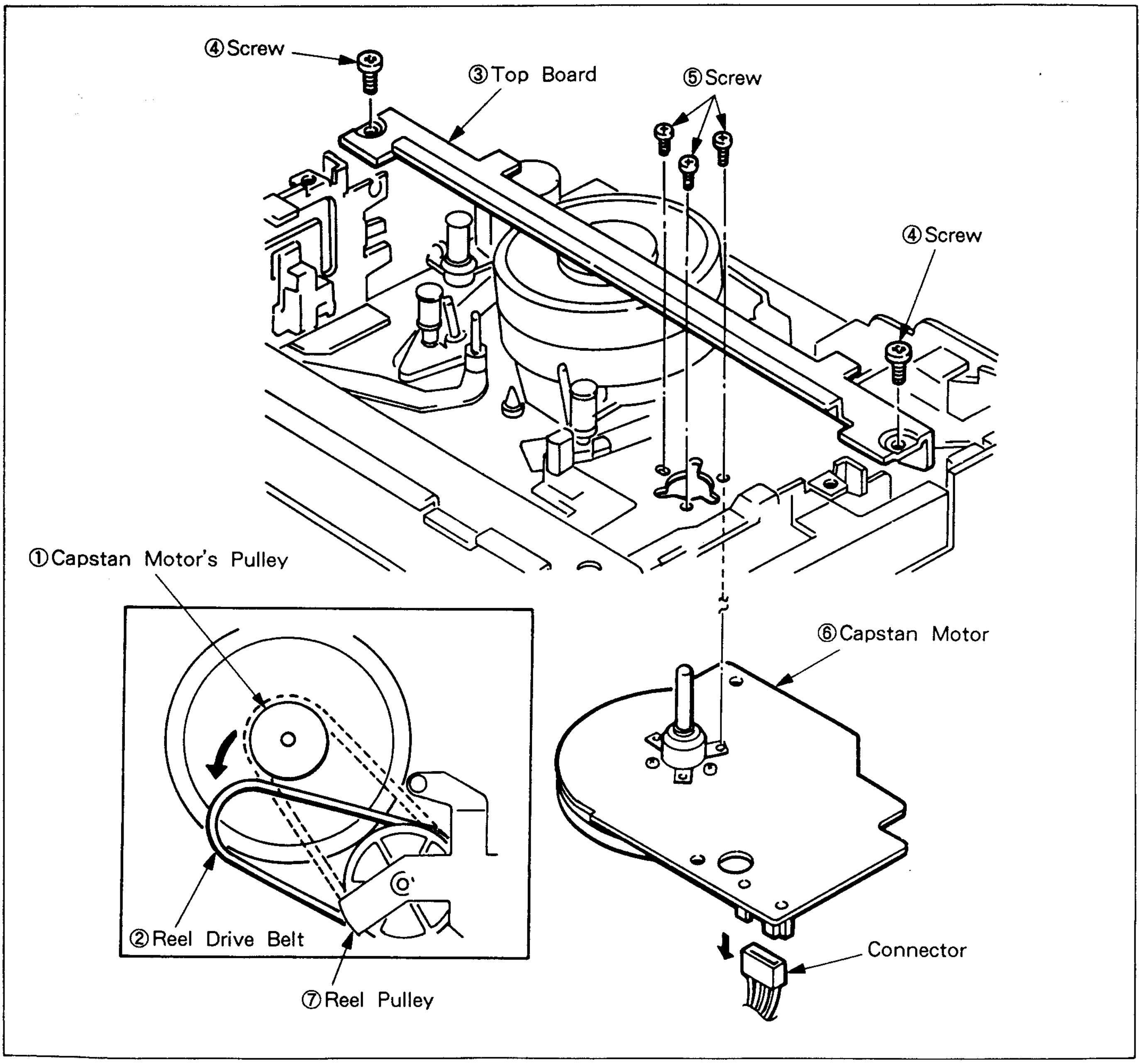

④Screw
③Top Board
⑤Screw
④Screw
①Capstan Motor's Pulley
⑥Capstan Motor
②Reel Drive Belt
Connector
⑦Reel Pulley

Fig. 5-9-1. Capstan Motor

5-10. FIXED GUIDE, FE HEAD LEVER ASS'Y

5-10-1. Entrance side Fixed Guide and FE Lever Ass'y (See Fig. 5-10-1.)

1. Removal

1) Remove the SP NUT ①, then remove the GUIDE PIPE ③ and the SP washer ② (lower), in that order.
2) Remove the SPRING COIL ⑤.
3) Remove the FTE HEAD connector.
4) Remove the special washer ⑥, then remove the FE HEAD LEVER ASS'Y ⑦.

Note : A SP washer ⑪ (upper) and a SPRING COIL ④ are sometimes inserted between the SP NUT ① and the special washer ⑥. In this case, put it back in its original position when remouting the entrance side fixed guide.

2. Remounting

1) After mounting the FE LEVER ASS'Y ⑦ onto the axle ⑧, mount the special washer ⑥.
2) Hook the SPRING COIL ⑤ between the chassis notch ⑨ and the FE LEVER ASS'Y hook ⑩.
3) Mount the SP washer ② (lower), the GUIDE pipe ③ and the SP NUT ① to the axle ⑧, in that order.

   (At that time, do not excessively tighten the SP NUT ① to avoid idle rotation of the axle rivet. The height of fixing guide on the entrance side is not required.)
4) Connect the connector to the FTE HEAD.
5) Perform hight adjustment of the entrance side fixed guide (S) as instructed in 6-4 when remounted the SPRING COIL ④ and the SP washer ⑪ (upper).

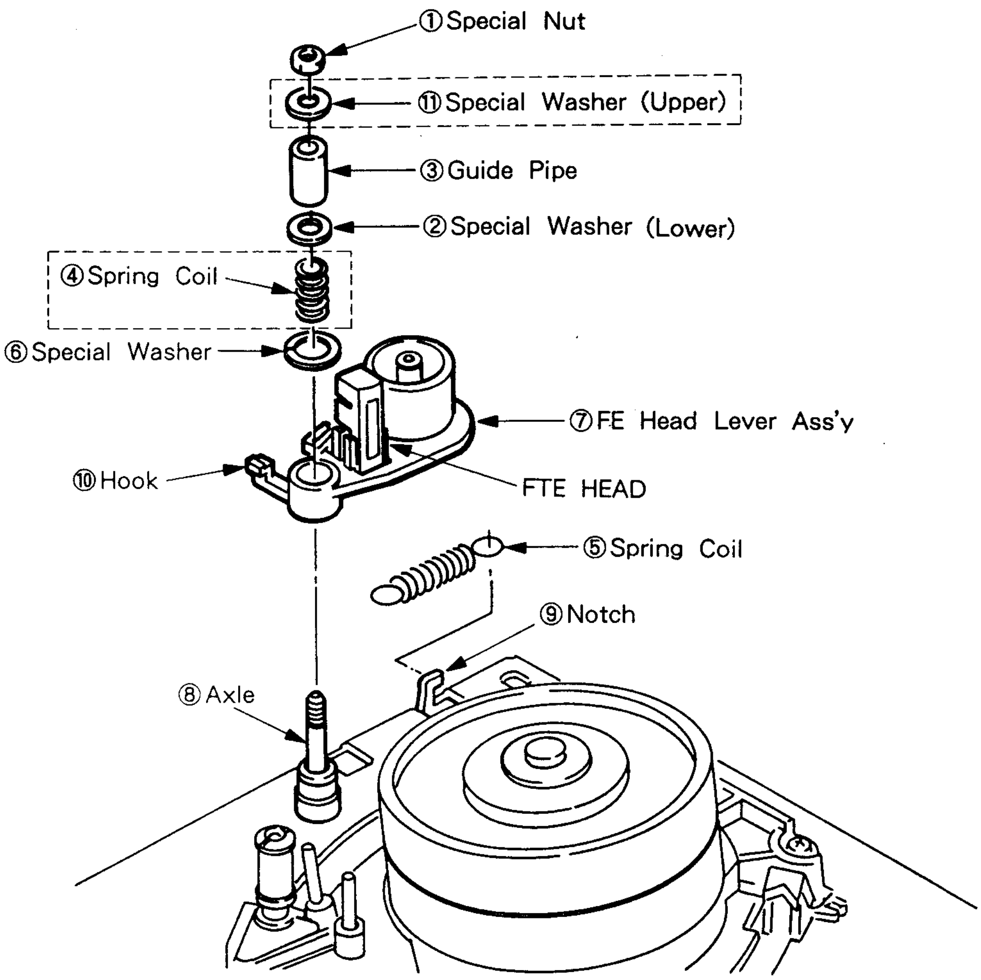

①Special Nut
⑪Special Washer (Upper)
③Guide Pipe
②Special Washer (Lower)
④Spring Coil
⑥Special Washer
⑦FE Head Lever Ass'y
⑩Hook
FTE HEAD
⑤Spring Coil
⑨Notch
⑧Axle

Fig. 5-10-1. Fixed Guide (S) & FE Lever Ass'y

5-10-2. Impedance Roller, FTE Head (See Fig. 5-10-2.)

1. Removal

1) Remove the FTE HEAD (full track erase head) ① connector.
2) Remove the special washer ②, then remove the IMPEDANCE ROLLER ③ and the washer ④.
3) Open the hook ⑤ a little and remove the FTE HEAD ①.

Note : Take care not to open the hook too much, otherwise it may be deformed or broken.

2. Remounting

1) Mount the FTE HEAD ① onto the FE HEAD LEVER ASS'Y ⑥. Confirm that the hook ⑤ is hooked to the FTE HEAD ①.
2) Mount the washer ④ and the IMPEDANCE ROLLER ③, in that order, onto the axle ⑦, then mount the special washer ②.
3) Connect the connector to the terminal of the FTE HEAD ①.

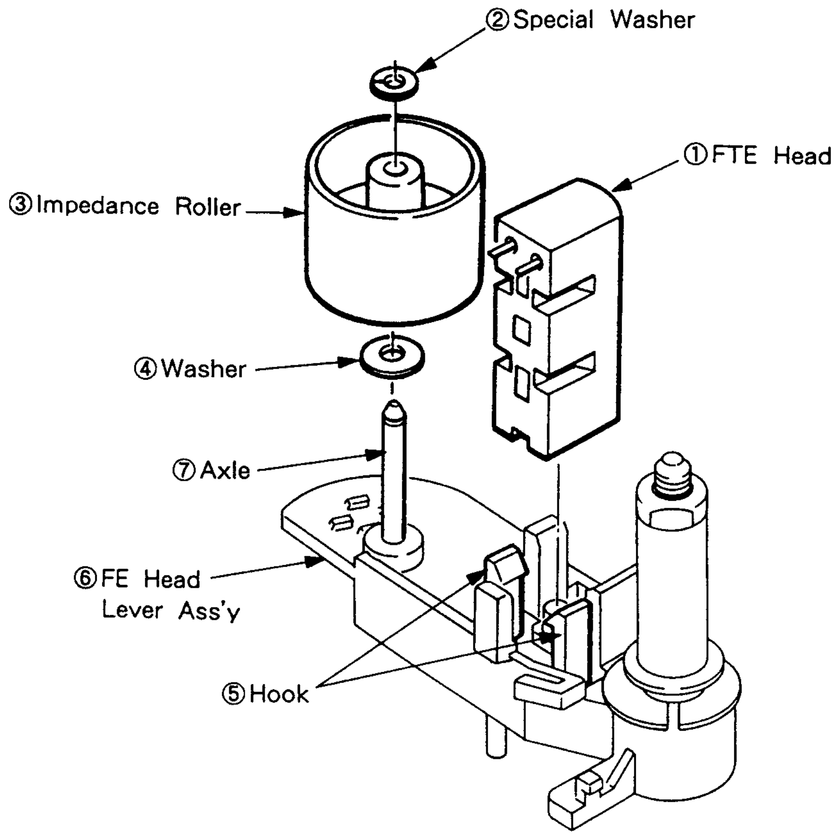

②Special Washer
①FTE Head
③Impedance Roller
④Washer
⑦Axle
⑥FE Head Lever Ass'y
⑤Hook

Fig. 5-10-2. Impedance Roller & FTE Head

5-10-3. Exit side Fixed Guide (See Fig. 5-10-3.)

1. Removal

1) Remove the CAP ①.
2) Remove the SP NUT ②, then remove the SP washer ③ (upper), the GUIDE PIPE ④, the SP washer ③ (lower) and the SPRING COIL ⑤, in that order.

2. Remounting

1) Mount the SPRING COIL ⑤, the SP washer ③ (lower), the GUIDE PIPE ④, the SP washer ③ (upper) and the SP NUT ②, in that order, to the axle ⑥.
2) Mount the CAP ① onto the axle ⑥.
3) Perform height adjustment of the fixed guide (T) as instructed in 6-4.

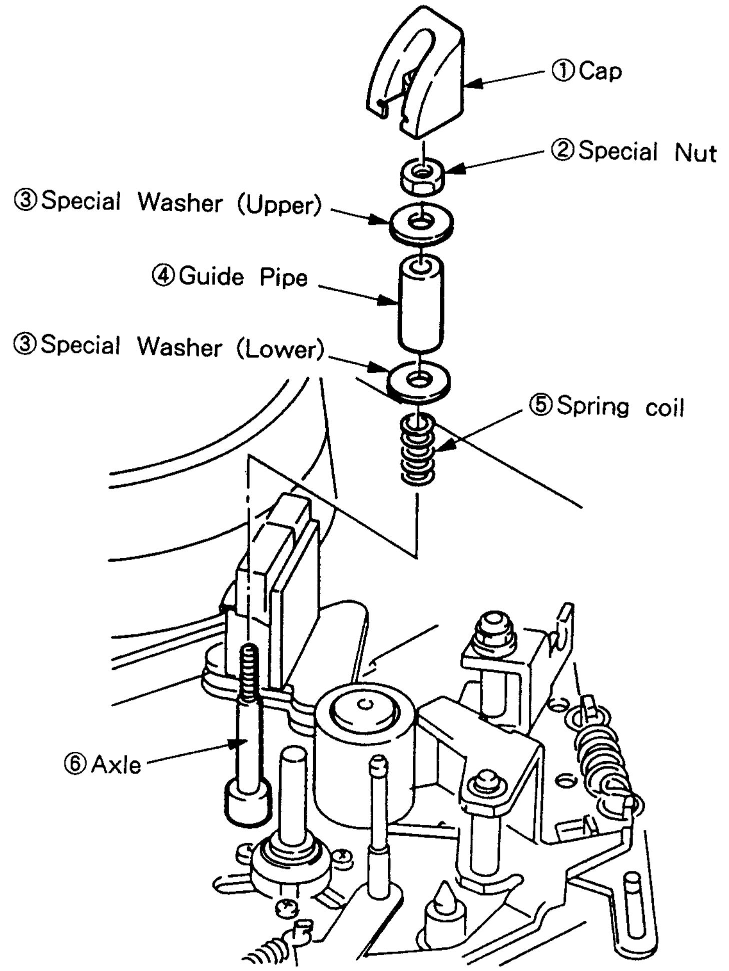

①Cap
②Special Nut
③Special Washer (Upper)
④Guide Pipe
③Special Washer (Lower)
⑤Spring coil
⑥Axle

Fig. 5-10-3. Fixed Guide (T)

5-11. DRUM SECTION

5-11-1. Drum Motor (rotor, stator) (See Fig. 5-11-1.)

1. Removal

1) Remove the screw ①, then remove the CYLINDER EARTH ASS'Y ②.
2) Remove the two screws ③, then remove the ROTOR ④ and SPACER.
3) Remove the STATOR board connector ⑩.
4) Remove the three screws ⑤, then remove the STATOR ⑥.

2. Remounting

1) Mount the STATOR ⑥ with the three screws ⑤.
2) Mount the SPACER ⑪ on to the AXLE ⑫.
3) While aligning the ROTOR oval hole ⑦ with the ROTOR DISK hole ⑧, mount the ROTOR with the two screws ③.
4) Insert the connector ⑩.
5) While aligning the CYLINDER EARTH ASS'Y ② protuberance with the chassis hole ⑨, mount it with the screw ①.

Note 1 : Use a torque driver (VHJ-0014) for mounting the STATOR ⑥ and the ROTOR ④. Set fastening torque to 3kg-cm.

Note 2 : When the drum unit has been replaced, perform a tape path adjustment as instructed in 6-4. and perform a CH-1/CH-2 switching position adjustment of the servo circuit.

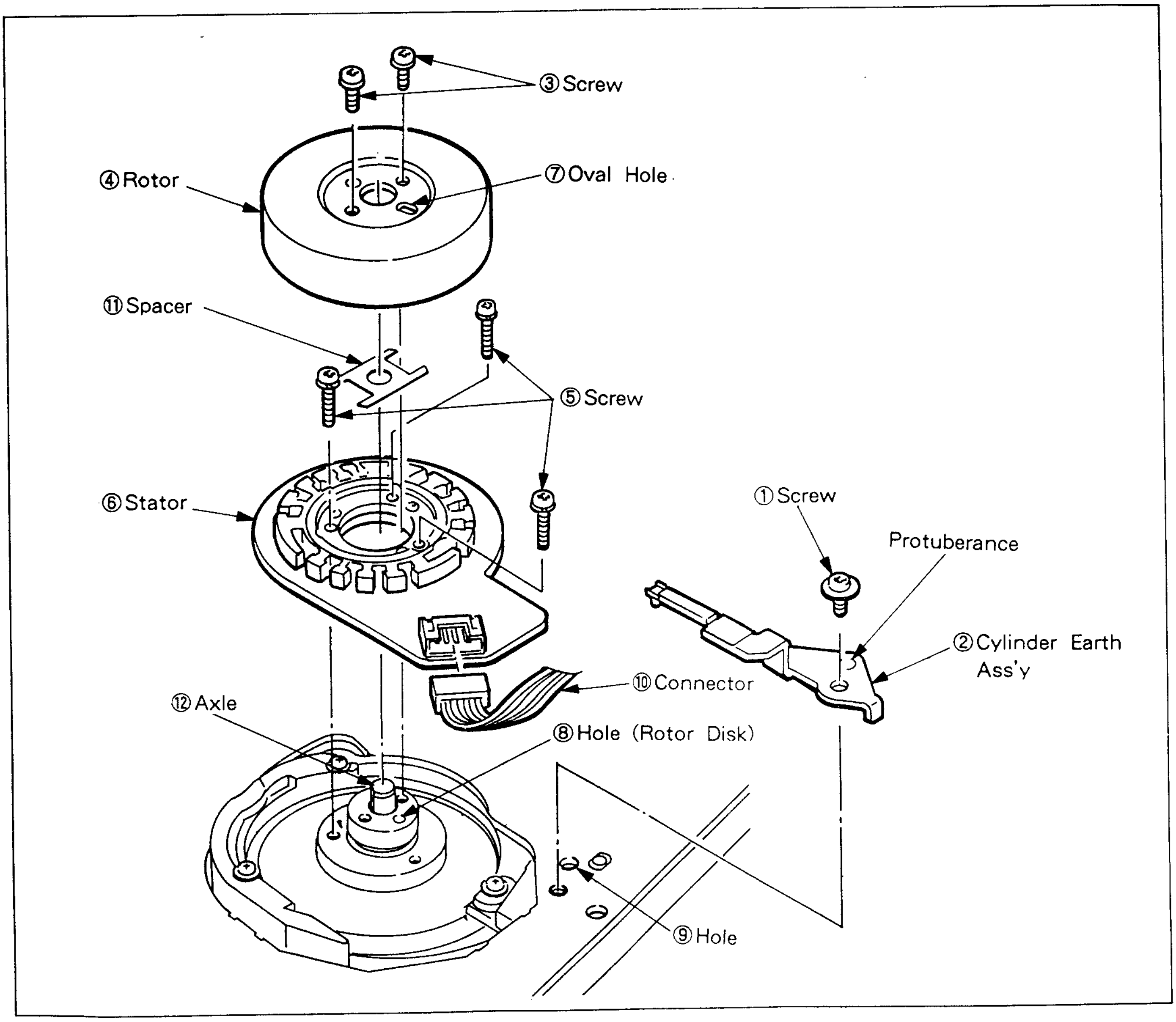

③Screw
④Rotor
⑦Oval Hole
⑪Spacer
⑤Screw
⑥Stator
①Screw
Protuberance
②Cylinder Earth Ass'y
⑩Connector
⑫Axle
⑧Hole (Rotor Disk)
⑨Hole

Fig. 5-11-1. Drum Motor

5-11-2. Drum Unit (See Fig. 5-11-2.)

1. Removal

1) For some models with the board located above the upper drum, remove the board.
2) Remove the flexible cable ① from the PRE-AMP UNIT (take care not to pull the flexible cable in the upward direction).
3) Remove the LOAD RACK only, as instructed in 5-4-1.
4) Remove the three screws ②, then remove the drum unit ③.

NOTE : When removing and remounting the drum unit, handle it carefully to protect it from scratches and dirt.

2. Remounting

1) While aligning the drum unit ③ to the protuberance, mount it to the drum base (CYLINDER BASE) ⑤ with the three screws ②.
2) Mount the ROAD RACK as instructed in 5-4-1.
3) Insert the flexible cable into the PRE-AMP UNIT.
4) Clean the drum unit.
5) Perform the tape path adjustment as instructed in 6-4. and perform the CH-1/CH-2 switching position adjustment of the servo circuit.

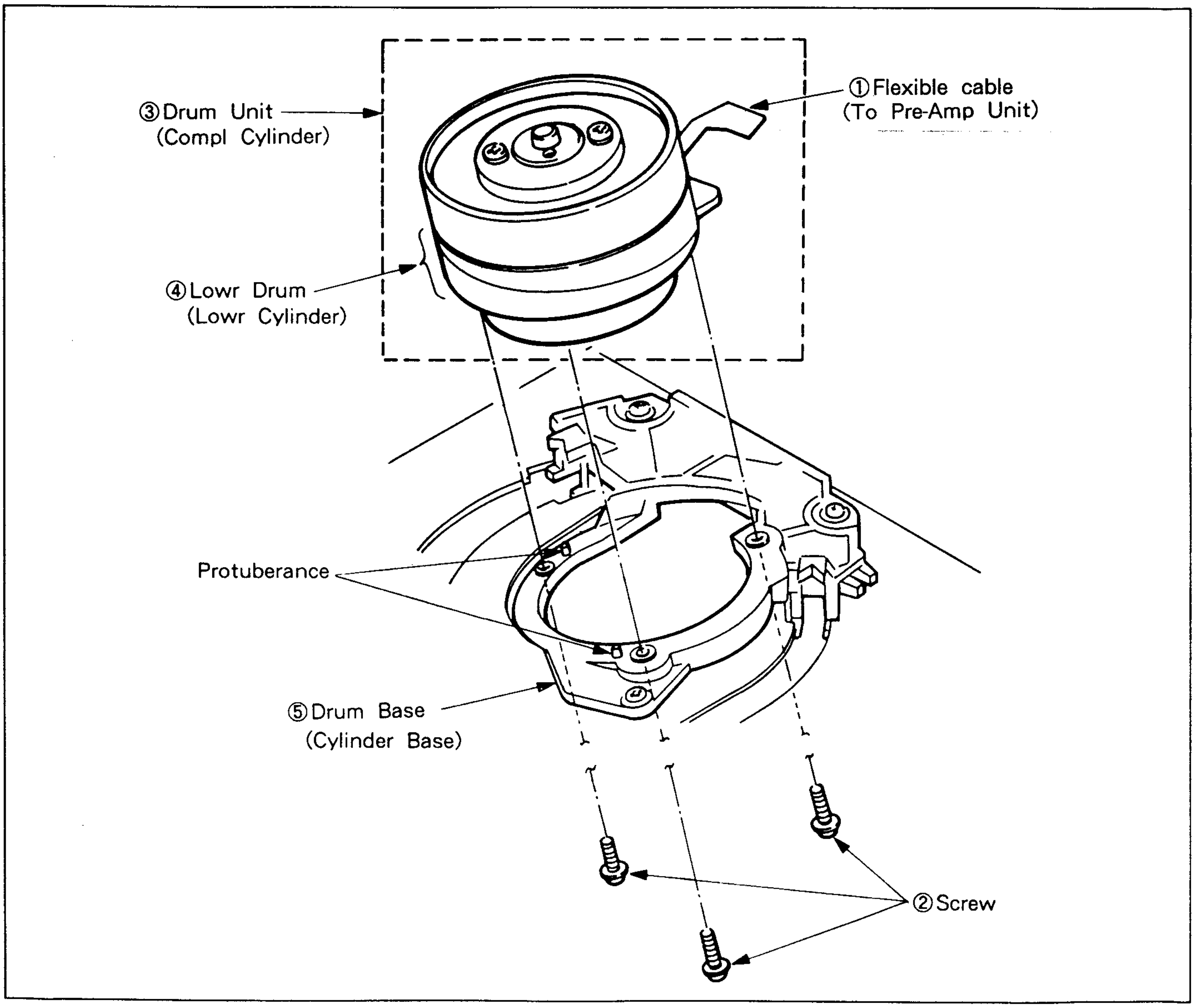

③Drum Unit
(Compl Cylinder)
①Flexible cable
(To Pre-Amp Unit)
④Lowr Drum
(Lowr Cylinder)
Protuberance
⑤Drum Base
(Cylinder Base)
②Screw

Fig. 5-11-2 Drum Unit (Compl Cylinder)

5-11-3. Upper Drum (Upper Cylinder)

1. Removal

1) Remove the two screws ① (see Fig. 5-11-3).
2) In case the RE (ROTARY ERASE) HEAD is attached to the upper drum (UPPER CYLINDER), remove the lead wires soldered from the P.C. board (see Fig. 5-11-4.).
3) Turn the head removing jig (VHJ-0041) handle ② counterclockwise to lift up the stopper ③ (see Fig. 5-11-5.).
4) Insert the two long screws ④ of the jig into the screw holes ⑥ located on the head chip side of the upper drum (UPPER CYLINDER) ⑤, then mount by turning the handle clockwise.
5) While holding the jig so that the upper drum ⑤ does not rotate, turn the handle ② clockwise to remove the upper drum.
6) Remove the jig from the upper drum.

Note : Handle parts carefully to protect the drum from scratches and dirt, and the video head from damage.

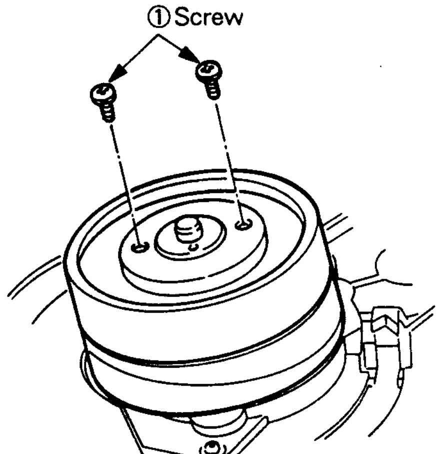


Fig. 5-11-3

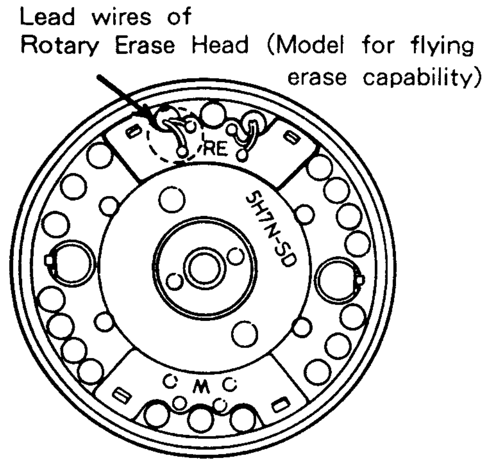

Lead wires of
Rotary Erase Head (Model for flying erase capability)
RE
5H7N-SD
C M C

Fig. 5-11-4

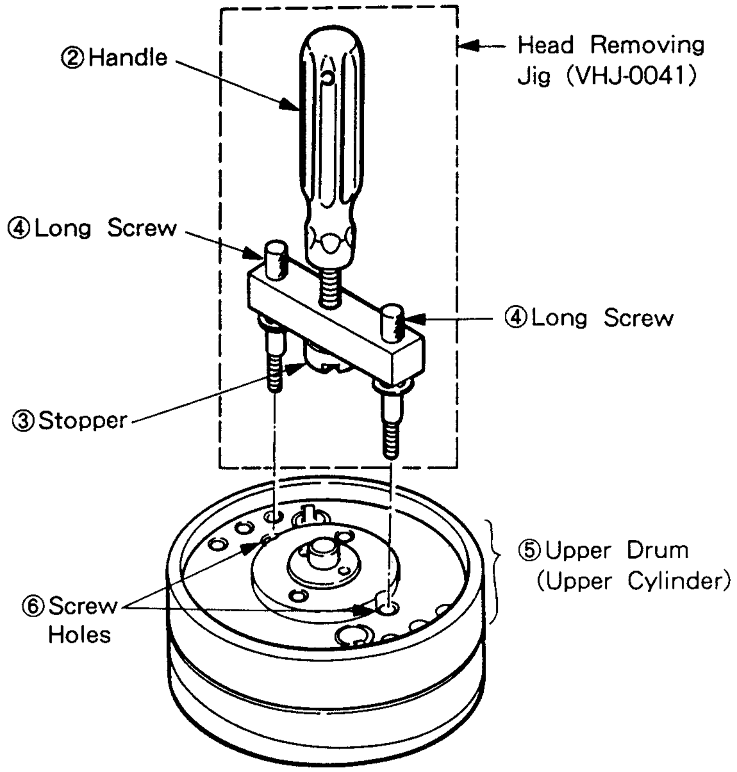

②Handle
Head Removing Jig (VHJ-0041)
④Long Screw
④Long Screw
③Stopper
⑤Upper Drum (Upper Cylinder)
⑥Screw Holes

Fig. 5-11-5

Upper Drum (Upper Cylinder)

2. **Remounting (See Fig. 5-11-6.)**

1) Confirm that surfaces where the flywheel and the upper drum (UPPER CYLINDER) are engaged or make contact portion are free from scratches and dirt.
2) The code name ① of the drum is printed on the video head side of the upper drum ⑤ SP CH-1 (channel A, plus azimuth). The code name ① is set with in the rotary transformer terminal round hole side ② position of lower drum (LOWER CYLINDER), so that the two screw holes ③ of the upper drum are aligned with the two screw holes ④ of the flywheel. (Refer to 3. Recognizing the SP CH-1 Head side).
3) In case the RE (ROTARY ERASE) HEAD is attached to the upper drum, pass the lead wires through the lead wire hole. (See Fig.5-11-4.)
4) While keeping the upper drum ⑤ parallel to the lower drum (LOWER CYLINDER) ⑧, insert it completely into the flywheel.
5) Temporarily tighten the two screws ⑦ alternately a little at a time, then tighten them to a torque of 6kg-cm using a torque driver (VHJ-0014) and a 3mm bit (VHJ-0045).
6) In case the RE head is attached to the upper drum ⑤, solder the lead wires to the P.C. board. Solder the red lead wire to the R terminal, and the yellow lead wire to the Y terminal.

Note : When the upper drum has been replaced, perform a tape path adjustment as instructed in 6-4. and CH-1/CH-2 switching position adjustment of the servo circuit.

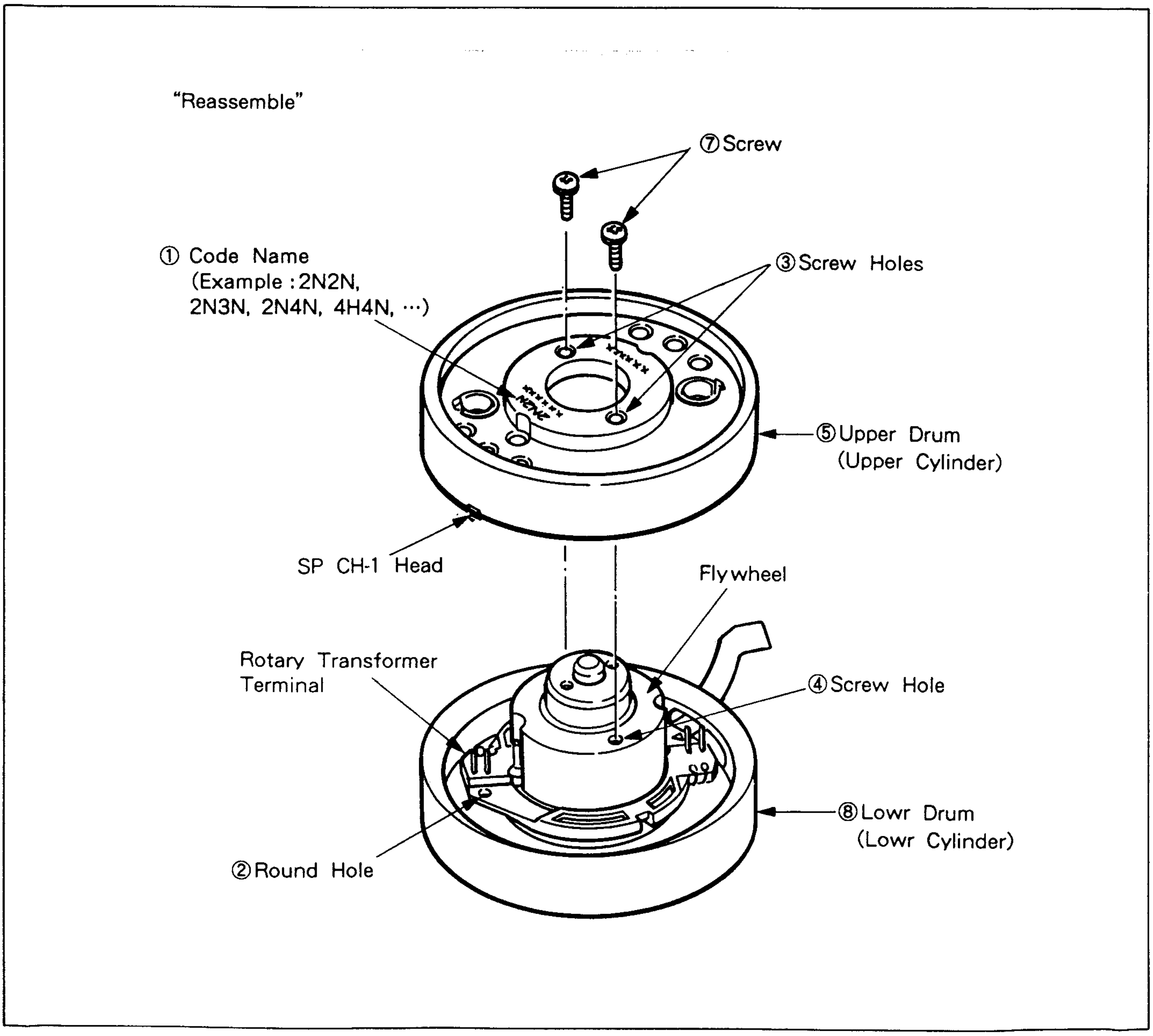
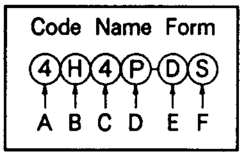

"Reassemble"
⑦Screw
① Code Name
(Example : 2N2N, 2N3N, 2N4N, 4H4N, ···)
③Screw Holes
⑤Upper Drum
(Upper Cylinder)
SP CH-1 Head
Flywheel
Rotary Transformer Terminal
④Screw Hole
⑧Lowr Drum
(Lowr Cylinder)
②Round Hole

Fig. 5-11-6.

3. **Recognizing the SP CH-1 Head Side**
No playback picture can be obtained if the video head is not wired as a pair with the rotary transformer located inside the lower drum rotating section. Therefore, mounting position should be matched when mounting the upper drum. In the P90 mechanism series, the code name of the drum is printed on the SP CH-1 (CH-A, plus azimuth) side as a mark for mounting the upper drum. (See Fig. 5-11-7.) This code name differs according to the drum type, but its basic form is as follows :


Code Name Form
④Ⓗ④Ⓟ-ⒹⓈ
A B C D E F

A = Number of head bases
B = "N" for normal audio
"H" for HI-FI audio
C = Number of heads
D = TV system ("N" or "P")
EF = Code for detailed classification. Depending on drum type, it can also be just one character, or a blank space.

Examples of Detailed Classification Codes
V = Head with level difference
D = Compatible with digital units
S = SVHS-compatible

Examples of Code Names
2N2P, 2N2P-L, 2N2P-V, 2N2P-D, 2N3P, 2N4P, 4H4P, 4H4P-D

Moreover, there is a round hole with marking purposes on the SP CH-1 (CH-A, plus azimuth) side of the lower drum rotary transformer terminal. As shown in Fig. 5-11-8, there are two types of rotary transformer terminals (the number of pins differs according to the number of heads).

Note : When ordering parts such as drums (CYLINDERS), do not use the code names ; always refer to the parts list and order with the specified part numbers.

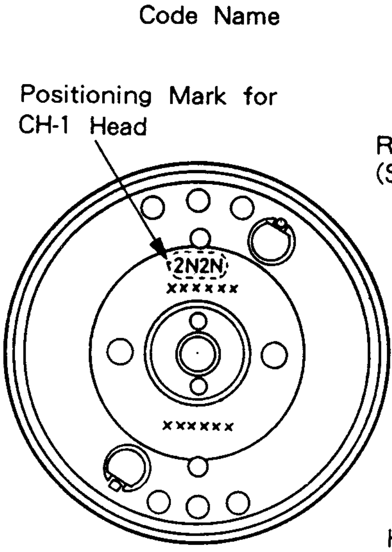

Code Name
Positioning Mark for CH-1 Head
2N2N
××××××
××××××

Fig. 5-11-7. Upper Drum

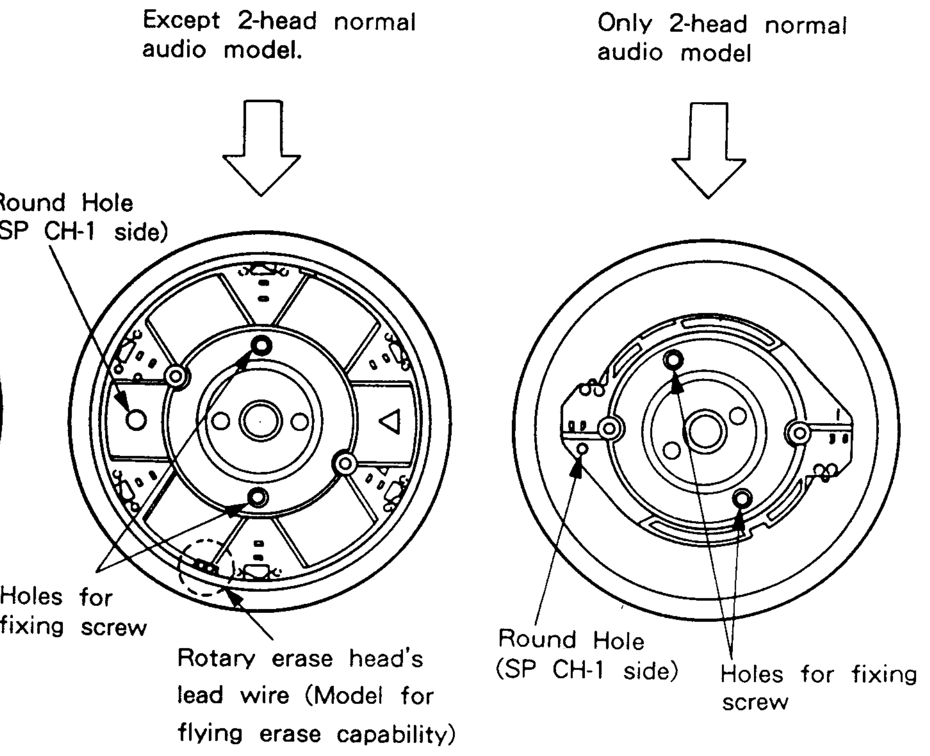
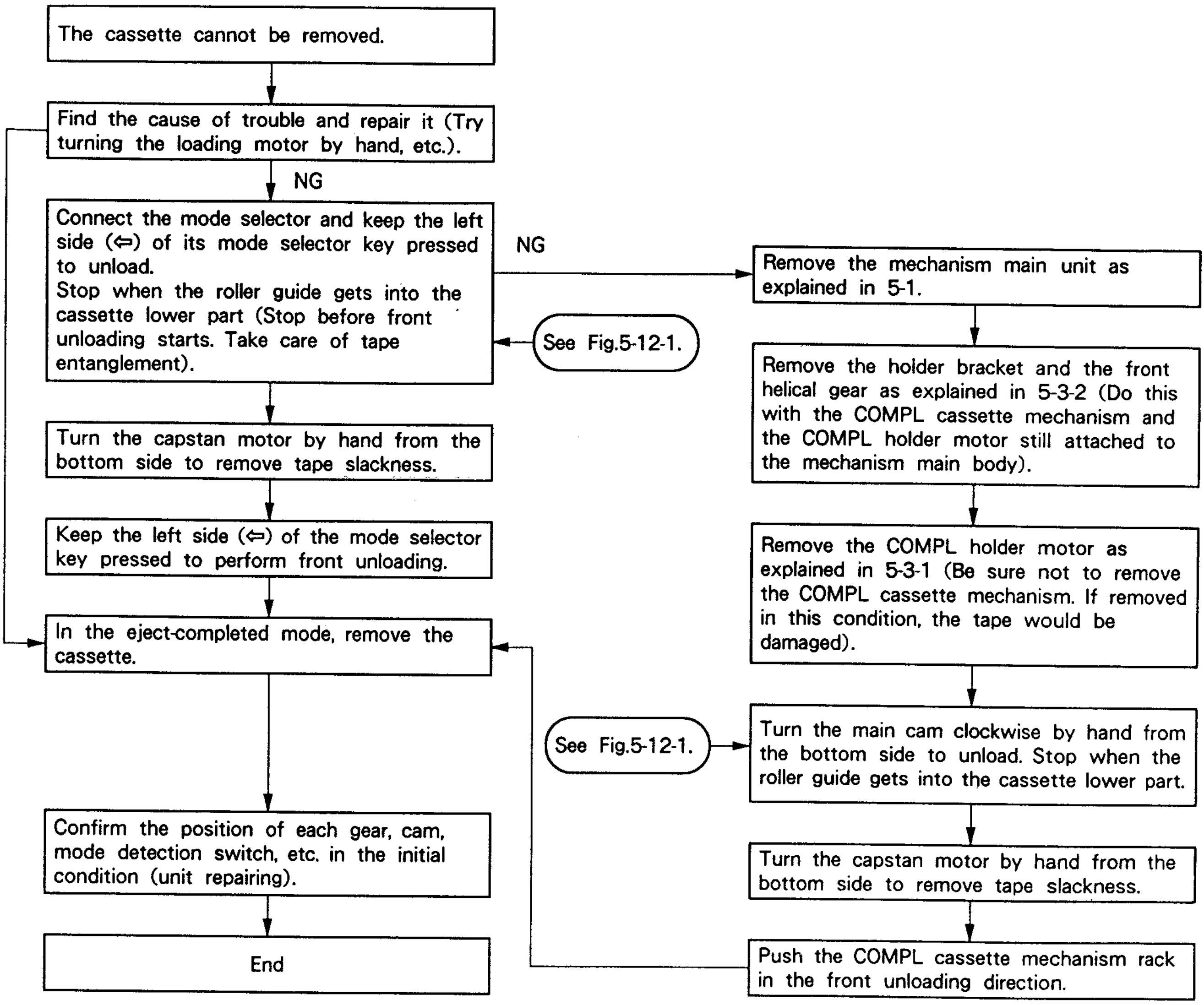

Except 2-head normal audio model.
Only 2-head normal audio model
Round Hole (SP CH-1 side)
Holes for fixing screw
Rotary erase head's lead wire (Model for flying erase capability)
Round Hole (SP CH-1 side)
Holes for fixing screw

Fig. 5-11-8. Lower Drum

5-12. HOW TO PROCEED WHEN THE CASSETTE CANNOT BE REMOVED



The cassette cannot be removed.

Find the cause of trouble and repair it (Try turning the loading motor by hand, etc.).

NG

Connect the mode selector and keep the left side (⇦) of its mode selector key pressed to unload.
Stop when the roller guide gets into the cassette lower part (Stop before front unloading starts. Take care of tape entanglement).

See Fig.5-12-1.

Turn the capstan motor by hand from the bottom side to remove tape slackness.

Keep the left side (⇦) of the mode selector key pressed to perform front unloading.

In the eject-completed mode, remove the cassette.

Confirm the position of each gear, cam, mode detection switch, etc. in the initial condition (unit repairing).

End

NG

Remove the mechanism main unit as explained in 5-1.

Remove the holder bracket and the front helical gear as explained in 5-3-2 (Do this with the COMPL cassette mechanism and the COMPL holder motor still attached to the mechanism main body).

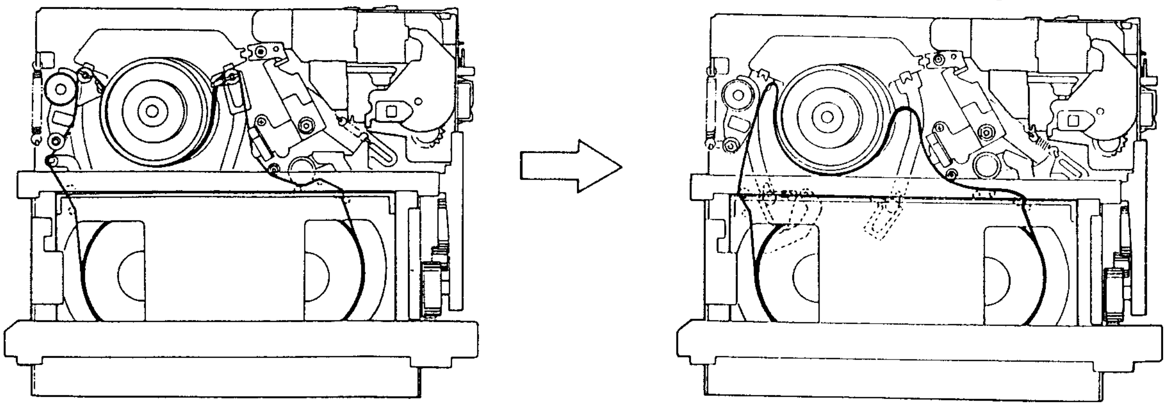
Remove the COMPL holder motor as explained in 5-3-1 (Be sure not to remove the COMPL cassette mechanism. If removed in this condition, the tape would be damaged).

See Fig.5-12-1.

Turn the main cam clockwise by hand from the bottom side to unload. Stop when the roller guide gets into the cassette lower part.

Turn the capstan motor by hand from the bottom side to remove tape slackness.

Push the COMPL cassette mechanism rack in the front unloading direction.



Before unloading

After unloading

Perform unloading using the mode selector.

First rotate the capstan motor by hand from the bottom to take-up the tape slack, and perform front-unloading using the mode selector.

Fig. 5-12-1

6. MECHANISM ADJUSTMENT

6-1. OPERATING THE MECHANISM WITH NO CASSETTE INSERTED (See Fig. 6-1-1.)

1) Attach black vinyl tape to the T. END and T. TOP sensors to prevent light from entering.
2) Push the TRAY LOCK LEVER in the direction of the arrow to maintain the unlocked condition. Release the lever just before the TRAY starts moving down.
3) In this condition, operation is possible in every mode. However, the following procedures are necessary to operate the unit in the REC, REW and R-SEARCH modes.

REC mode :	Push the SAFETY SW LEVER to turn the SAFETY SWITCH (Erasure Prevention Switch) ON, then press the REC button. If the SAFETY SWITCH is not turned ON, the unit will enter the EJECT mode.
REW/R-SEARCH :	After pressing the REW button, turn the TAKE-UP REEL ASS'Y by hand. Otherwise, the reel sensor will operate, setting the INITIAL mode after 2 to 3 seconds.

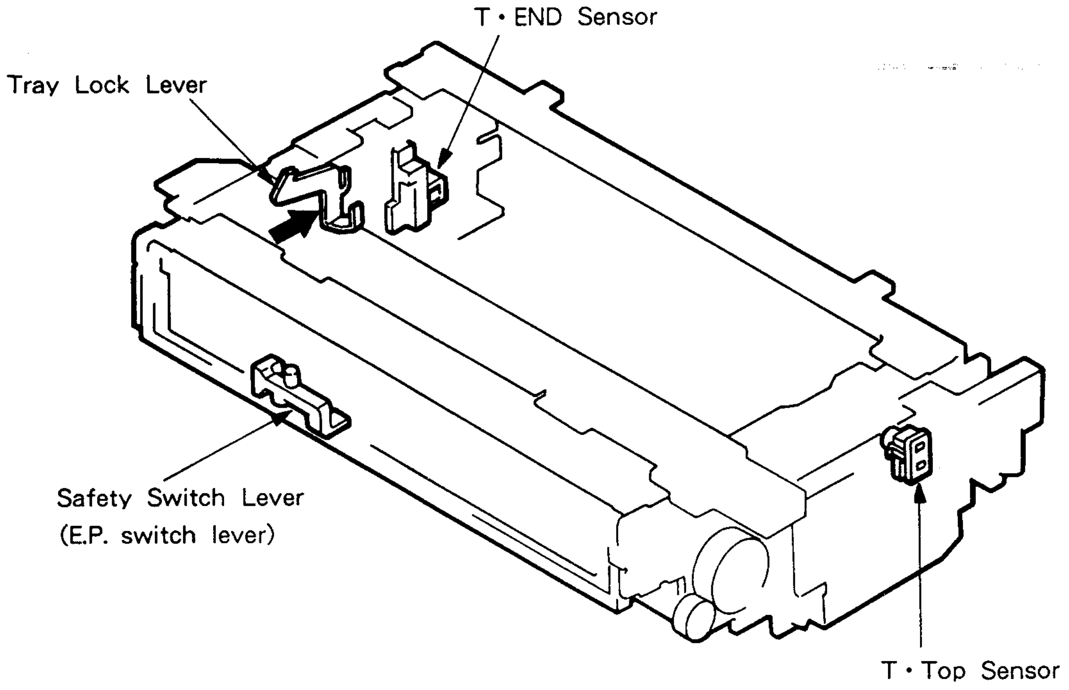


Fig. 6-1-1. Preparations for Adjustment

6-2. REEL TABLE HEIGHT ADJUSTMENT AND TORQUE CHECK

6-2-1. Reel Table Height (See Fig. 6-2-1.)

If the SUPPLY REEL ASS'Y or the TAKE-UP REEL ASS'Y is replaced, it will be necessary to adjust the REEL TABLE height.

(1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

(2) Attach the cassette stand plate gauge (VHJ-0001) and slide the gauge in the direction of the arrows.

(3) Confirm that, when the gauge stops, the REEL TABLEs are not in contact with surface A of the plate and are in contact with surface B.

(4) If the REEL TABLE is in contact with surface A, remove a spacer and check again.

(5) If the REEL TABLE is not in contact with surface B, add a spacer and check again.

(6) Remove the cassette stand plate gauge.

(7) Set the EJECT mode with the mode selector.

(8) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.

Note :

- Adjust the reel table height by adding or removing spacers (0.13t, 0.25t, 0.3t, 0.4t and 0.5t) as appropriate so that the height meets the specifications. Use the same method for both the TAKE-UP REEL TABLE and the SUPPLY REEL TABLE.
  (The 0.5t washer is included as the standard washer for the SUPPLY REEL ASS'Y. The 0.4t washer is included as the standard washer for the TAKE-UP REEL ASS'Y.)
- If the height of the reel table is not within the specified value, the tape edge might be damaged as a result, or the tape path adjustment might not be possible to make.

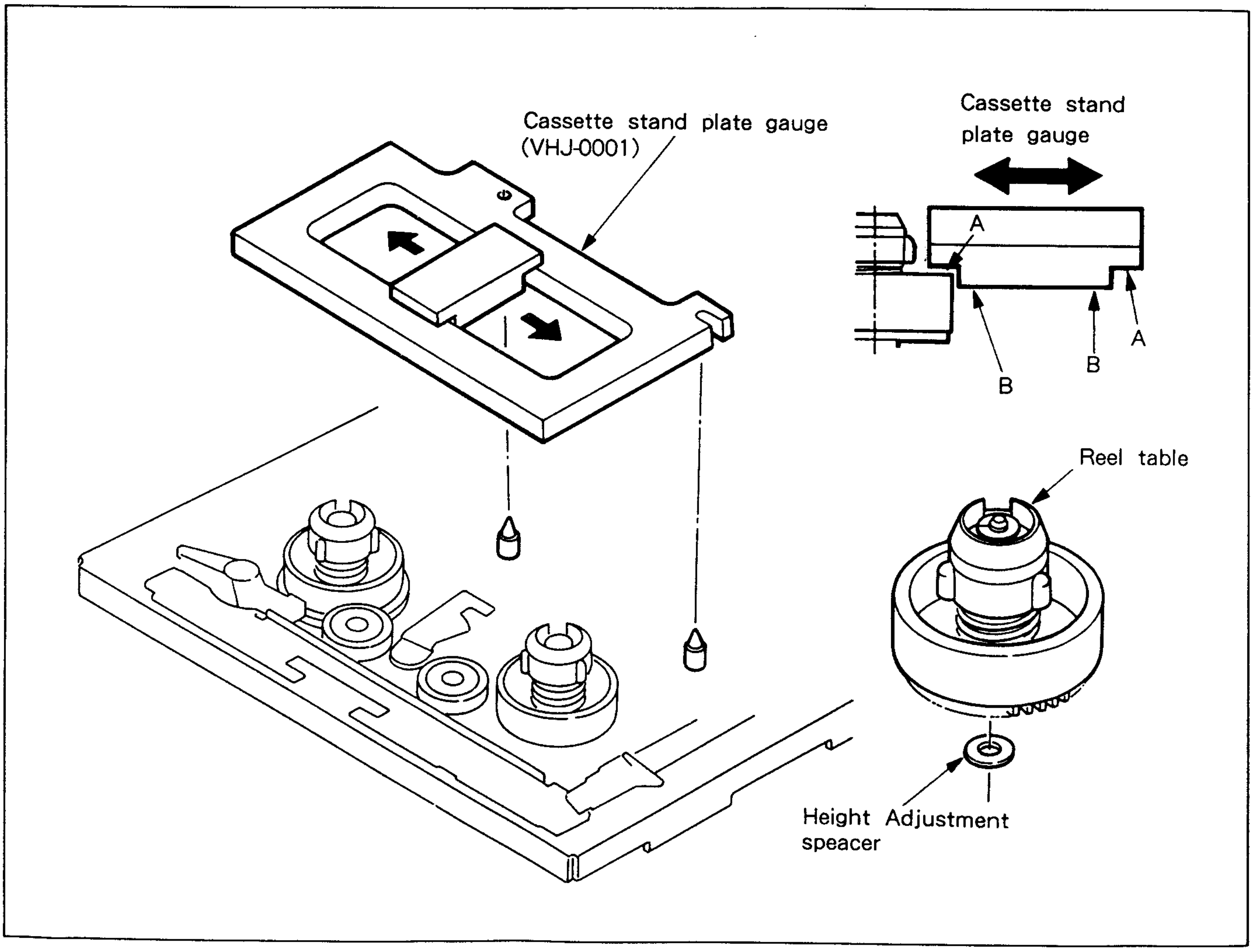


Fig. 6-2-1 . Reel Table Height Adjustment

6-2-2. Torque Check (See Fig. 6-2-2.)

1) Set the unit to operating condition without a cassette inserted as instructed in 6-1.
2) Measure the SUPPLY REEL TABLE torque in the REW mode, and confirm that it is 750gcm or more. Perform this measurement keeping the torque gauge in a fixed position with your hand (locked torque).
3) Measure the TAKE-UP REEL TABLE torque in the F.FWD mode, and confirm that it is 600gcm or more (locked torque).
4) Measure the TAKE-UP REEL TABLE torque in the playback mode (SP tape speed), and confirm that it is within 100 through 160gcm (locked torque).
5) Measure the SUPPLY REEL TABLE torque in the REV (F-SEARCH) mode, and confirm that it is within 150 through 240 gcm (locked torque).
6) After confirming that torque readings are within the specifications for each mode, check the following :
   - ⓐ Dirt on the capstan motor and the REEL PULLEY groove.
   - ⓑ Deterioration of the REEL DRIVE BELT.
   - ⓒ Deterioration of the FRICTION GEAR ASS'Y felt (torque during playback).
   - ⓓ Wear and damage of the COMPL CLUTCH MECHANISM and the reel drive system gears.

Note1 : Items ⓑ, ⓒ and ⓓ require replacement if found defective.

Note2 : The measured value of torque during FF and REW represents the value 2 seconds after starting.

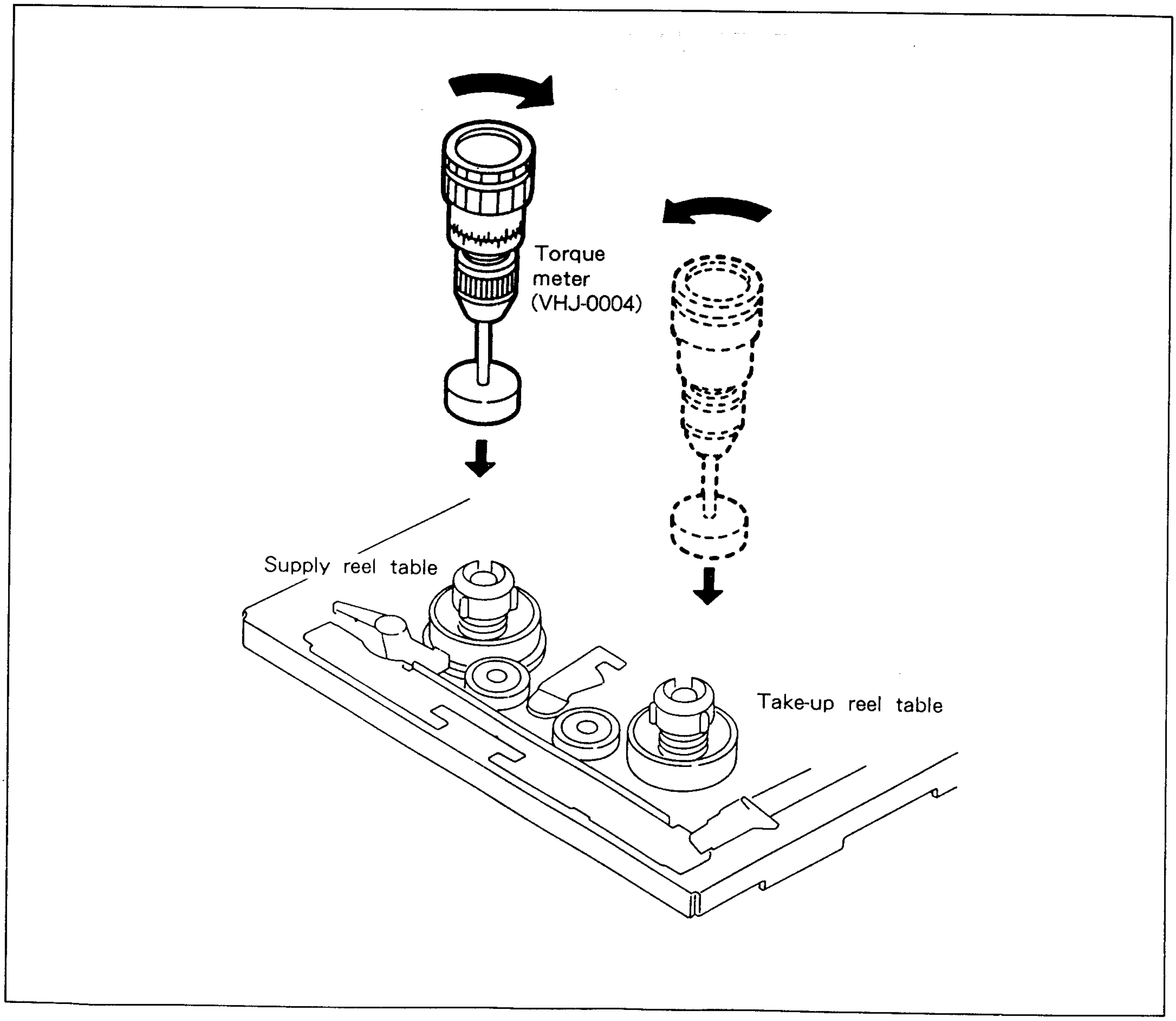


Fig. 6-2-2 Checking REW/FF/PLAY Torque

6-3. TENSION POLE (BACK TENSION GUIDE) POSITION ADJUSTMENT AND BACK TENSION TORQUE CHECK

6-3-1. Tension Pole (Back Tension Guide) Position Adjustment (See Fig. 6-3-1.)

1) Remove the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
2) Set the PLAY mode with the mode selector (VHJ-0050).
3) Attach the position adjustment gauge (VHJ-0049) ①.
4) Confirm that the tension pole ② is within the position adjustment gauge frame.
5) In case the tension pole is not within the above-mentioned frame, adjust it by loosening the screw ④ a little and changing the mounting position of the BAND HOLDER ⑤ in the direction of the arrow Ⓐ.
6) Remove the position adjustment gauge ①.
7) Set the EJECT mode with the mode selector.
8) Mount the COMPL CASSETTE MECHANISM as instructed in 5-2-1.
9) Confirm that back tension torque is within 50 ± 10gcm, as instructed in 6-3-2 below.

6-3-2. Back Tension Torque Check (See Fig. 6-3-1.)

1) Attach the cassette torquemeter (VHJ-0016) and set the PLAY mode.
2) Confirm that back tension torque is within 50 ± 10 gcm.
3) In case back tension torque does not meet the above specification, proceed as follows:

ⓐ Clean the portion where the brake band (BAND HOLDER ASS'Y) ⑦ of the SUPPLY REEL ASS'Y ⑥ makes contact.

ⓑ Confirm that the brake band of the BAND HOLDER ASS'Y ⑦ does not make wear and that it is clean. If wear or dirt is found, replace the band holder assembly ⑦ as instructed in 5-7-3.

ⓒ Replace the TENSION LEVER ASS'Y SPRING COIL ⑧.

Note : Always follow procedures in 6-3-1. Tension Pole Position Adjustment after performing ⓐ, ⓑ and ⓒ.

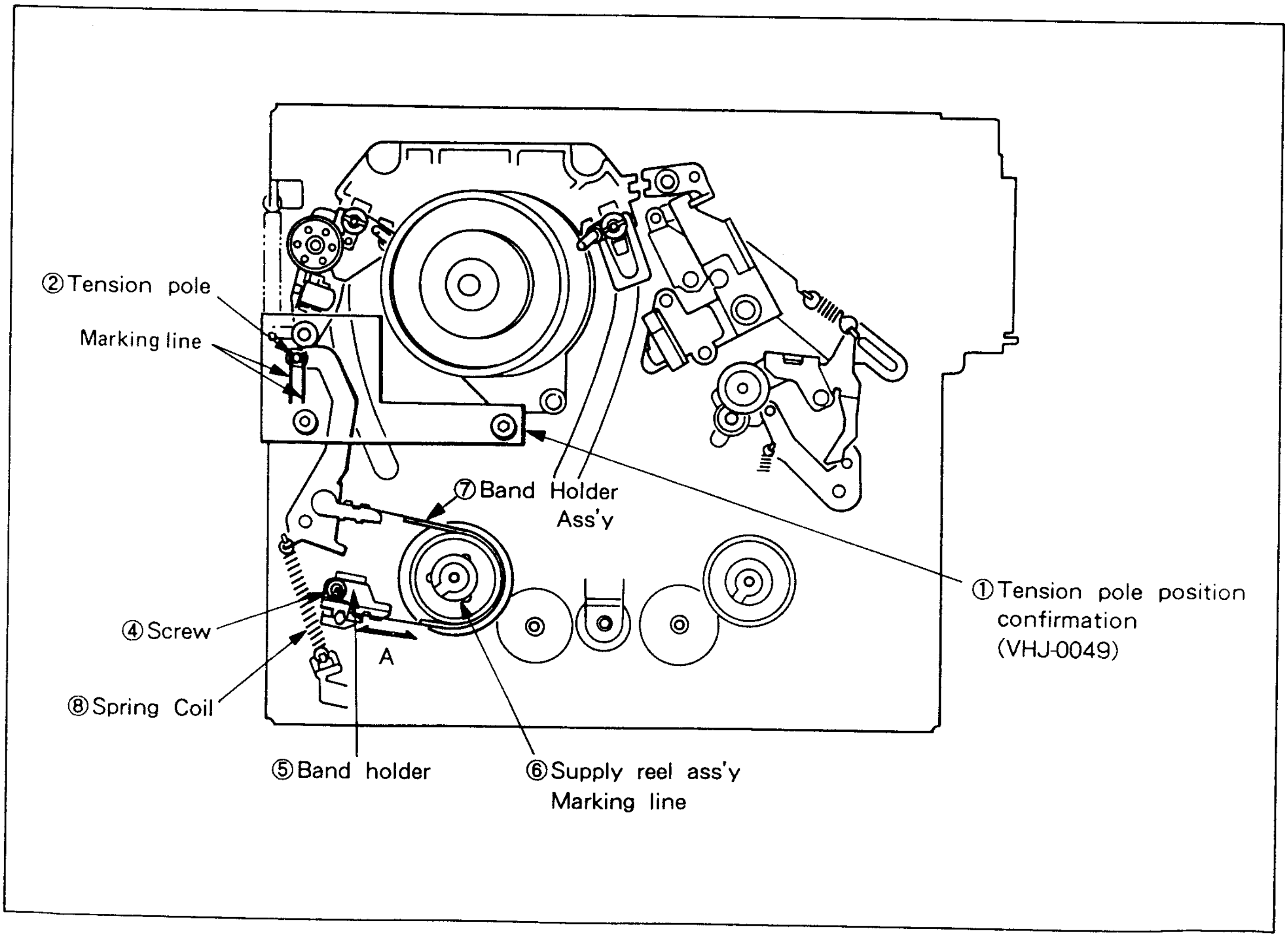

②Tension pole
Marking line
⑦Band Holder Ass'y
①Tension pole position confirmation (VHJ-0049)
④Screw
A
⑧Spring Coil
⑤Band holder
⑥Supply reel ass'y Marking line

Fig. 6-3-1. Tension Pole Positioning Adjustment

6-4. TAPE PATH ADJUSTMENT

The tape path mechanism is precisely adjusted at the factory. Normally no readjustment is required, but checking and/or adjustment is necessary when parts of the tape path mechanism among those shown in the figure below (See Fig. 6-4-1.) have been removed or replaced after a long period of use.
This operation consists of adjusting the various guides so that the tape drawn out from the supply reel runs smoothly along the DRUM (CYLINDER) lead surface. A way of grasping the tape path condition by electronic means is monitoring the video head output envelope waveform with an oscilloscope. However, the fact that visual observation is essential in order to know whether the tape is running through the various guides in a smooth and natural way should be kept in mind when checking and adjusting.
Also remember that the position of tape guides is not greatly affected by the replacement of the UPPER DRUM (UPPER CYLINDER) or the COMPL DRUM (COMPL CYLINDER), provided that it is correctly performed, and that only the replaced parts should be adjusted after replacing a tape guide or COMPL HEAD BRACKET, since the position of the other tape guides shall not change considerably.

6-4-1. Preparations for Adjustment

(1) Clean the tape transport surfaces (See Fig. 6-4-1.).
(2) Connect the oscilloscope. Connect the channel 1 probe to the envelope waveform test point, and the channel 2 probe to the SW30 (RF SW P) test point. During adjustment, apply a trigger to the low side of the SW30 (RF SW P) in order to monitor the waveform output from channel 1 of the video head.

Note : Since oscilloscope connection points differ according to the model, refer to the "Test Point for Tape Path Adjustment" allocation figure in the electric circuit adjustment section of the service manual book.

(3) Use a dentist's mirror for visual observation of tape path condition.
(4) Use a nut box (VHJ-0048) for adjustment of the fixed guides.
(5) Use an eccentric driver (VHJ - 0003) for adjustment of the guide rollers.
(6) When adjusting height of the fixed guide, guide rollers or COMPL head bracket, turn the special nut or the upper flange clockwise to push the tape downward, and counterclockwise to make the tape rise up.
(7) Do not use the damaged cassette tapes for tape path adjustment.

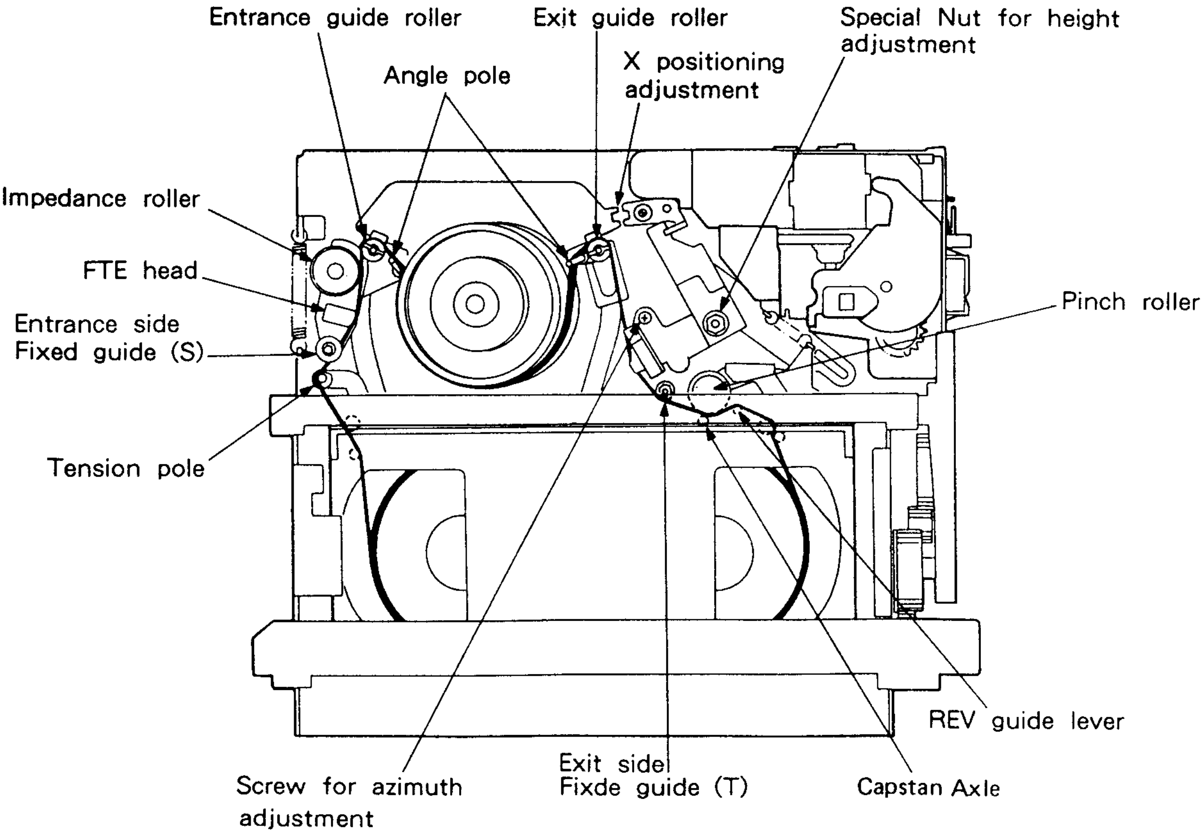

Entrance guide roller
Exit guide roller
Special Nut for height adjustment
Angle pole
X positioning adjustment
Impedance roller
FTE head
Entrance side Fixed guide (S)
Pinch roller
Tension pole
REV guide lever
Screw for azimuth adjustment
Exit side Fixde guide (T)
Capstan Axle

Fig. 6-4-1. Preparation for Adjustment

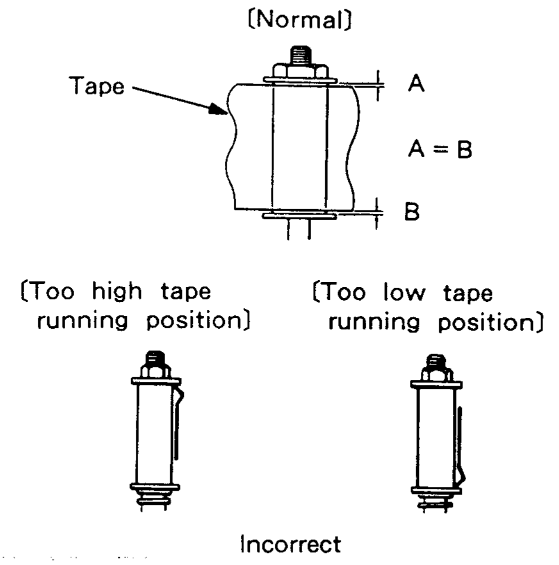
6-4-2. Adjustment by Visual Observation after Guide Roller, Fixed Guide or COMPL Head Bracket Replacement

Perform this adjustment after removing or replacing any of the above parts. Only for the replaced or removed parts, play back an alignment tape (VHJ-0009) beforehand and adjust height by visual observation.

(1) Exit Side Fixed Guide (See Fig. 6-4-2.)
Adjust so that the tape upper edge does not make contact with the fixed guide upper flange, and the tape lower edge does not make contact with the fixed guide lower flange. Gaps A and B should remain equal.

(2) Guide Rollers (See Fig. 6-4-3.)
The tape should not be curled by the guide roller upper and lower flanges. It should also run smoothly, without moving up and down on the DRUM (CYLINDER) lead surface.

Note : An excessive guide roller pressure may cause tape damage.


[Normal]
Tape
A
A = B
B
[Too high tape running position]
[Too low tape running position]
Incorrect

6-4-2. (1) Pre-set For Exit Side Fixed Guide

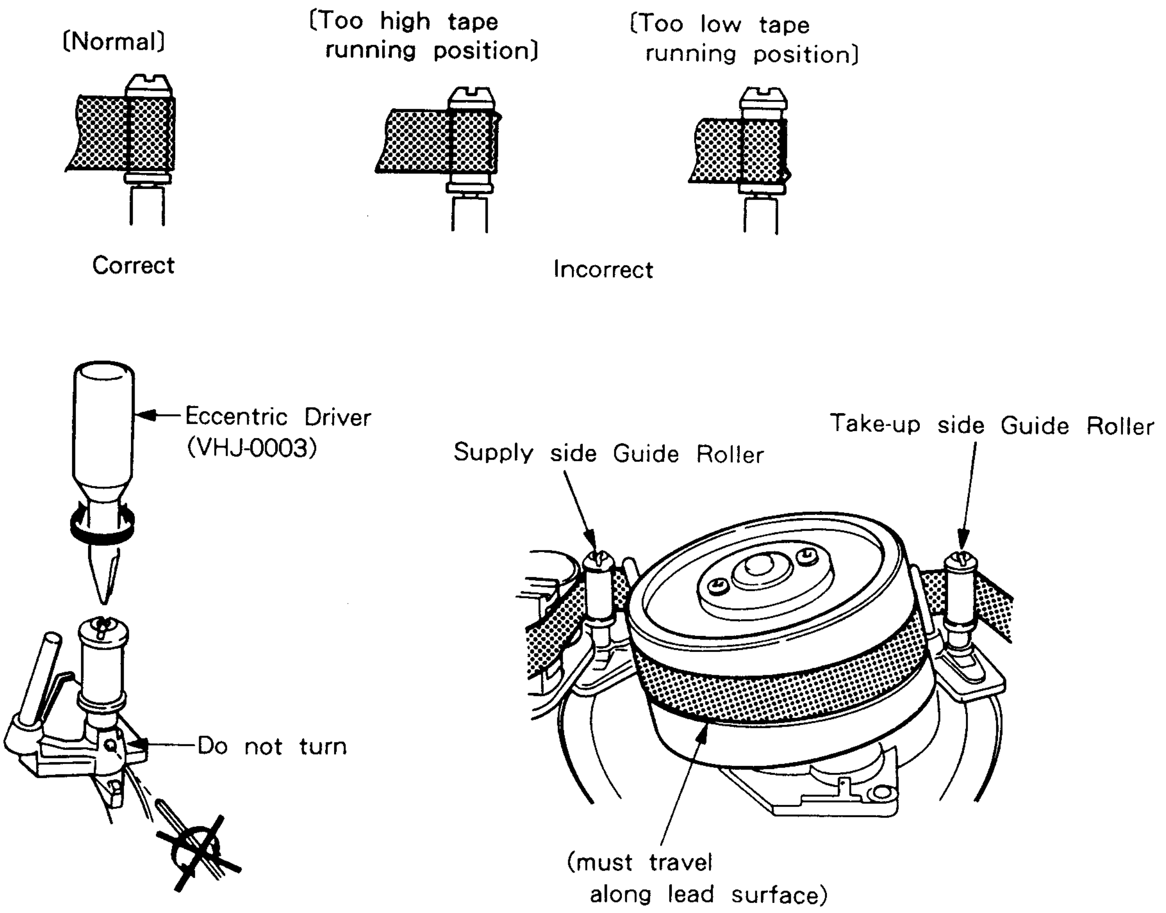

[Normal]
[Too high tape running position]
[Too low tape running position]
Correct
Incorrect
Eccentric Driver (VHJ-0003)
Do not turn
Supply side Guide Roller
Take-up side Guide Roller
(must travel along lead surface)

Fig. 6-4-3. (2) Pre-set for Guide Roller

(3) COMPL Head Bracket (ACE Head) (See Fig. 6-4-4.)
Adjust the special nut so that the tape edge runs between the audio head upper end and the control head lower end. Gaps A and B should be of about the same width. Since at this point it is only required that the control signal is picked up and the servo circuit works normally, no adjusting screws except the COMPL head bracket special nut should be touched.

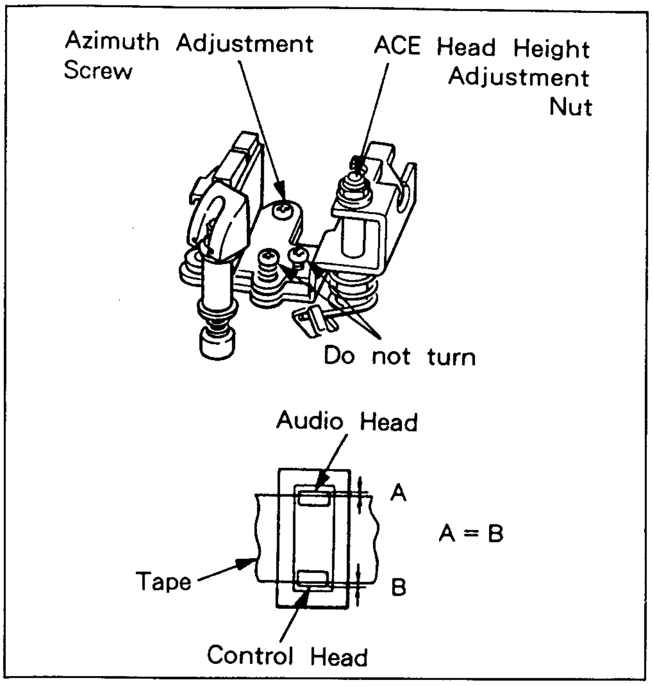

Azimuth Adjustment Screw
ACE Head Height Adjustment Nut
Do not turn
Audio Head
A
A = B
Tape
B
Control Head

Fig. 6-4-4. (3) Pre-set for Compl Head Bracket

6-4-3. Entrance Side Fixed Guide (S) Height Adjustment (See Fig. 6-4-5.)

The P90 mechanism entrance side fixed guide comes in two types ; the one in this unit is equipped with an upper flange and a spring coil, and it requires height adjustment. The other type is not provided with an upper flange and a spring coil. Height is naturally set when the special nut is fastened, so adjustment is not required.
For units with an upper flange, perform height adjustment as explained below. Even for types which do not require height adjustment, check whether the lower tape edge runs along the lower flange. Be careful not to fasten the special nut excessively, causing the axle to run idle.

1) Rotate the fixed guide (S) counterclockwise to lift the tape somewhat, then insert the fixed guide height gage (VHJ-0053) into the lower side of the fixed guide (S) lower flange.
2) Rotate the fixed guide (S) special nut clockwise a little at a time until the lower flange makes contact with the upper surface of the fixed guide height gage, causing a slight drag.
3) After rotating the special nut 90° counterclockwise, remove the Axed guide height gauge.
4) After adjusting the guide rollers in section 5-4-4, play back the alignment tape (VHJ-0009). Confirm that the tape lower edge runs in close contact with the fixed guide (S) lower flange. In case too much pressure has left a gap between the tape and the lower flange, or excessive lifting has caused curling of the tape lower edge, perform fine adjustment. However, do not adjust the special nut beyond 90° clockwise and 45° counterclockwise.

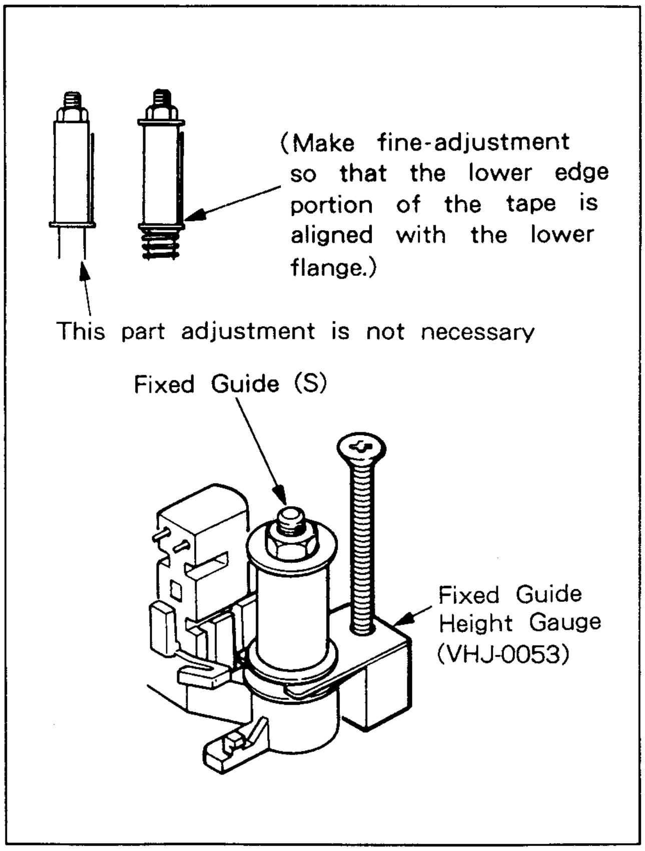

(Make fine-adjustment so that the lower edge portion of the tape is aligned with the lower flange.)
This part adjustment is not necessary
Fixed Guide (S)
Fixed Guide Height Gauge (VHJ-0053)

Fig. 6-4-5. Entrance Side Fixed Guides

6-4-4. Guide Roller Adjustment (See Fig. 6-4-6.)

1) Play back the alignment tape (VHJ-0009), press the tracking control key and adjust the envelope waveform to the maximum level.
2) Loosen the entrance and exit guide rollers by rotating them counterclockwise, then rotate them clockwise alternately until they are fastened and a flat video output waveform is obtained.
3) Confirm that the envelope waveform is not deformed, and check visually that no curling occurs at the guide roller upper and lower flanges.
4) Press the tracking control key and set the envelope waveform level to approx. 50% of the maximum. In this condition, confirm whether the envelope waveform is flat. It will not, showing valleys or peaks at the first half (entrance) or second half (exit), if the guide roller pressure is excessive or insufficient.
In case there is unevenness in the first half (entrance), adjust the entrance side guide roller. If the second half (exit) shows trouble, adjust finely the exit side guide roller.

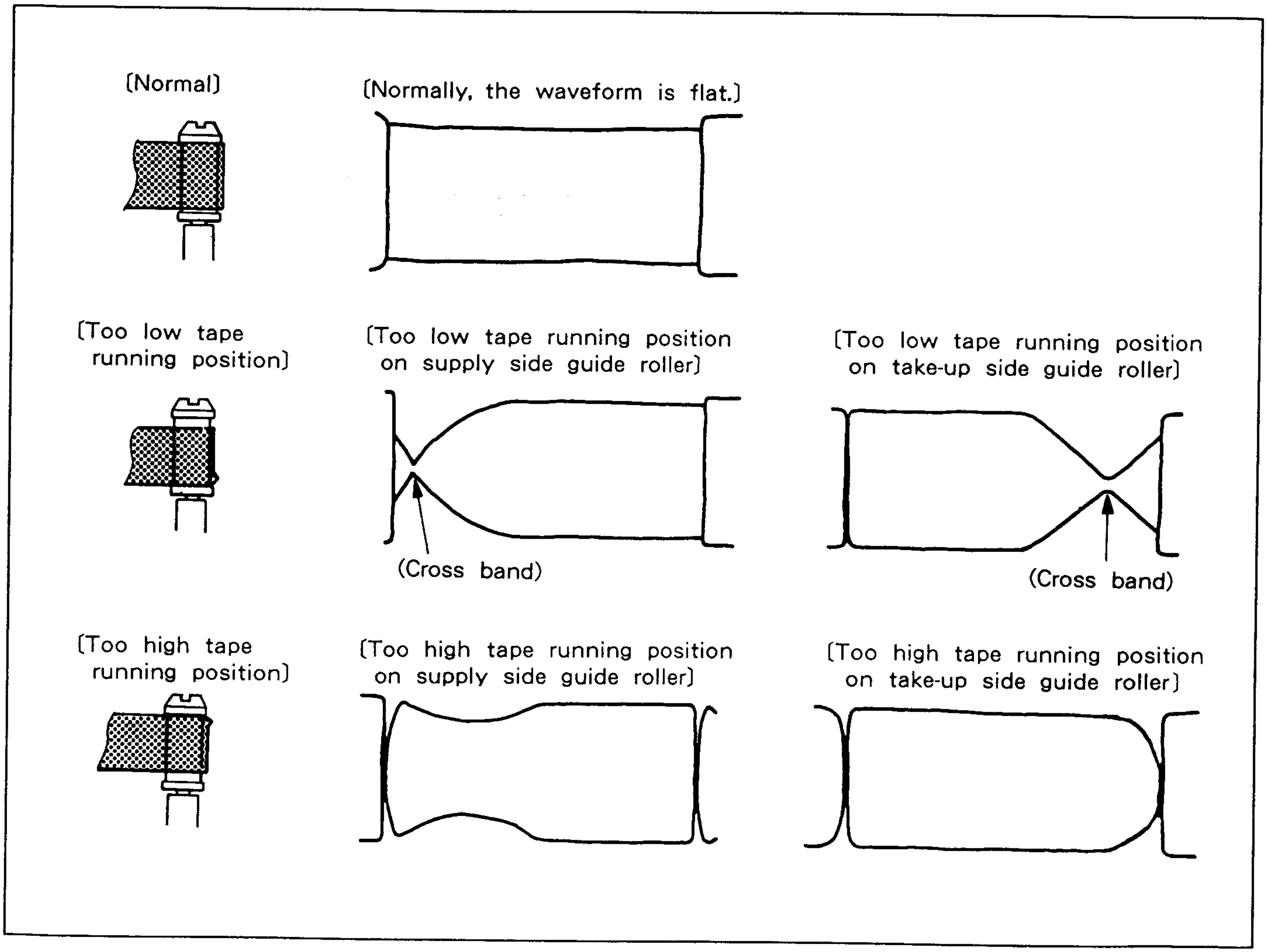

〔Normal〕
〔Normally, the waveform is flat.〕
〔Too low tape running position〕
〔Too low tape running position on supply side guide roller〕
〔Too low tape running position on take-up side guide roller〕
(Cross band)
(Cross band)
〔Too high tape running position〕
〔Too high tape running position on supply side guide roller〕
〔Too high tape running position on take-up side guide roller〕

Fig. 6-4-6. Guide Roller Adjustment

6-4-5. Exit Side Fixed Guide (T) Adjustment (See Fig. 6-4-7.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.
2) Rotate the special nut counterclockwise so that the lower flange lifts the tape until its lower edge is slightly curled.
3) Rotate the special nut clockwise a little at a time until curling of the tape lower edge is removed.
4) Confirm at each mode (PLAY, F.SEARCH, R. SEARCH, F.F and REW) that the tape runs along the lower flange and that no curling occurs.

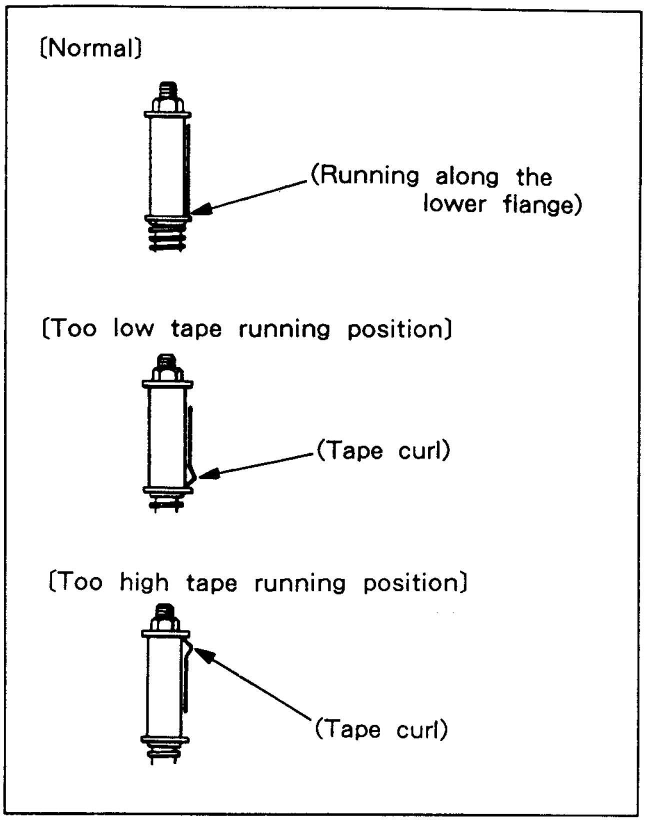

[Normal]
(Running along the lower flange)
[Too low tape running position]
(Tape curl)
[Too high tape running position]
(Tape curl)

Fig. 6-4-7. Fixed Guide (T)

6-4-6. COMPL Head Bracket (ACE Head) Adjustment

(1) Height Adjustment and Azimuth Adjustment (See Fig. 6-4-8.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.
2) Monitor the audio output waveform with the oscilloscope.
3) Rotate the azimuth adjustment screw until the audio output waveform amplitude is maximum.
4) After loosening the ACE head height adjustment special nut, rotate it slowly clockwise until amplitude of the audio output waveform is maximum, then adjust it finely clockwise to the point just before the said waveform amplitude begins to decrease.
5) Rotate the azimuth adjustment screw until amplitude of the audio output waveform is maximum.
6) Confirm that the audio output waveform amplitude does not fluctuate.

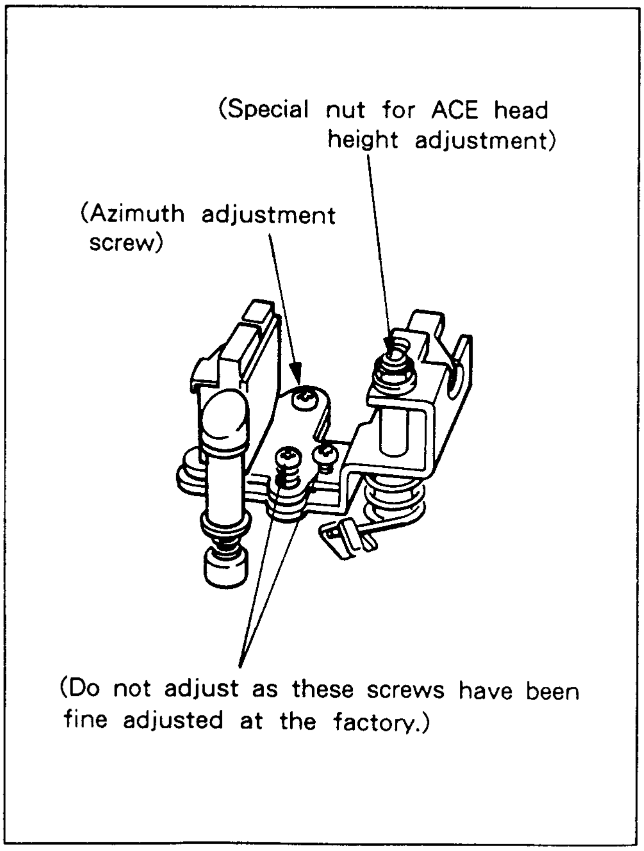

(Special nut for ACE head height adjustment)
(Azimuth adjustment screw)
(Do not adjust as these screws have been fine adjusted at the factory.)

Fig. 6-4-8. Compl Head Bracket

(2) Tracking (X Value) Adjustment (See Fig. 6-4-9.)

1) Load the alignment tape (VHJ-0009) and set the PLAY mode.

2) Set tracking to the center position with the tracking control key (See Note below).

3) Rotate the stopper bracket fixing screw 180° counterclockwise.

4) Monitor the video head output envelope waveform with the oscilloscope.

5) Adjust the stopper bracket position so that amplitude of the envelope waveform becomes maximum at the tracking center and the envelope waveform amplitude changes by the same amount when shifting the tracking center by pressing the plus (+) and minus (−) tracking control keys.

6) Tighten the fixing screw.

7) (Model for LP mode tape speed capability)
Playback the alignment tape (VHJ-0052) and set the tracking to the center using a tracking control key.
Then confirm that the playback picture on screen is normal. If not, Make readjustment by referring to items 1) through 7). To readjust, playback VHJ-0009 and finely adjust the position of the stopper bracket within the range in which the amplitude of the envelope waveform can be held to a maximum.

8) Perform servo circuit PB PHASE (Switching position) adjustment.

Note : For models equipped with auto tracking, always set to the manual tracking mode before adjustment. To confirm the tracking center position, press the tracking keys (+, −) and observe the front panel clock display. It will read "T − : −" at the tracking center, "T − : , T − − : " when keeping the minus (−) key pressed, and "T : −, T : − −" when keeping the plus (+) key pressed. The time indication will be restored 2 to 3 seconds after the tracking keys are released.

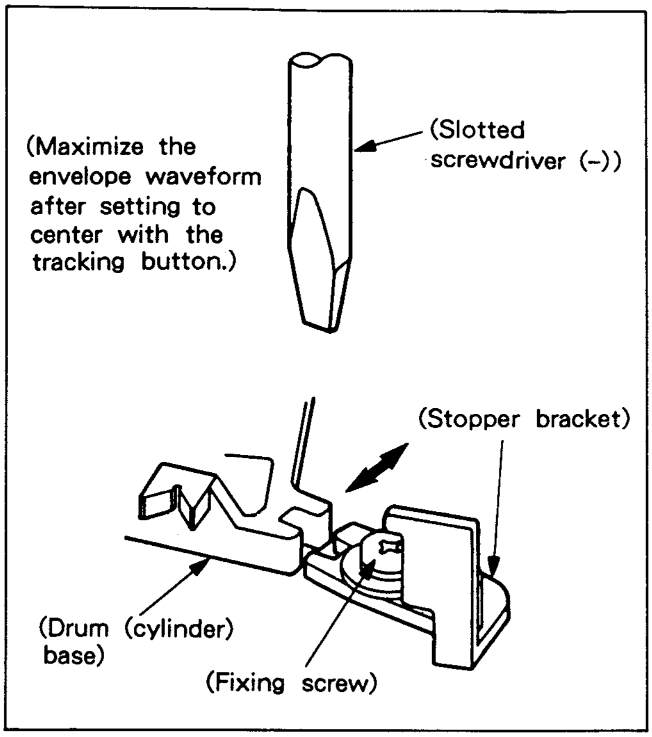

(Maximize the envelope waveform after setting to center with the tracking button.)
(Slotted screwdriver (−))
(Stopper bracket)
(Drum (cylinder) base)
(Fixing screw)

Fig. 6-4-9

6-4-7. Checking after Adjustment

Tape running may show a slight change depending upon the type of the cassette tape (thick or thin tape), the start, middle, or end of cassette tape winding, etc. After performing the tape path adjustment with use of an alignment tape, be sure to check the following points. Incidentally, the alignment tape to be used should be E-180 or E-240 cassette should be a good one without any damage to it.

(1) Try to play back the alignment tape (VHJ-0009) and confirm that the envelope waveform rise immediately and that there is no fluctuation in the envelope waveform and the audio output waveform.

(2) Load a cassette tape E-180 and start recording operation in the standard mode. 1 kHz should be fed to the audio input terminal when recording. After recording, the following points should be checked.

1. When the recorded portion is played back, the envelope waveform rise immediately, and no fluctuation in the envelope waveform is observed. Also, no speed drop occurs during the first half period or the last half period. Further, check to be sure that no fluctuation occurs in the audio waveform. Also confirm that neither the tape curling or derailing is caused on the upper or lower flange and the on the read side of the drum.
2. Confirm that no tape curling or derailing occurs in the upper or lower flange of each tape guide and the read side of the drum during each mode of operation, namely, FF, REW, F. SEARCH, and R. SEARCH.
3. Confirm that the envelope waveform rise immediately after changing the mode directly to the PLAY from each mode of FF, REW, F. SEARCH, R. SEARCH, or POWER OFF (INITIAL) and that no tape curling or derailing occurs in the upper or lower flange of the each tape guide and on the read side of the drum.

(3) Load a E-240 cassette tape and perform recording operation in the SP mode. 1 kHz should be fed to the audio input terminal when recording. Now, confirm that the envelope waveform rise immediately upon starting the playback of the recorded portion, and that neither fluctuation in the envelope waveform nor a speed drop occurs during the first half period or the last half period. Also confirm that no tape curling or derailing is caused in the upper or lower flange of each tape guide and on the drum lead surface.

(4) Perform recording for 60 seconds in the SP mode at the start of E-240 cassette winding. Play back the recorded portion and repeat the F.SEARCH ↔ R.SEARCH ten times, following which confirm that no damage is done to the tape edge. If any damage is found on the tape edge, a proper step must be taken as below depending upon the symptom obserbed.

1. When a sawtooth shaped damage is caused on underside of the tape edge by the REV guide
   1) Check to see if damage is done to the tape by the REV guide.
   2) Loosen the tilt adjustment screw of the ACE head bracket by turning it 135° counterclockwise.
   3) Make readjustment of the exit side fixing guide by referring to item 6-4-5.
   4) Make readjustment of the ACE head bracket (azimuth, height and adjustment of X value) by referring to item 6-4-6.
   5) Confirm that no fluctuation in the audio level is caused by loosening the tilt adjustment screw in steps 1) and 2) above. Move the screw a little back if any fluctuation is found (but never move it back to the original position). After adjusting the tilt adjustment screw is readjusted, perform steps 3) and 4) once again.
   6) Confirm again that the E-240 cassette tape does not sustain any damage.
   7) Perform the recording and playback on the E-180 and E-240 cassette tape and confirm that no fluctuation occurs in the envelope waveform and the audio waveform.

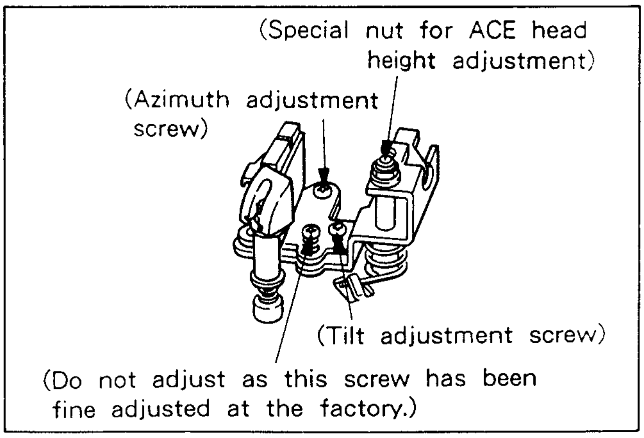

(Special nut for ACE head height adjustment)
(Azimuth adjustment screw)
(Tilt adjustment screw)
(Do not adjust as this screw has been fine adjusted at the factory.)

Fig. 6-4-10 Compl Head Bracket

2. If damage in the form of a sawtooth or a streak is found on the tape edge
   1) Check if a large amount of magnetic particles is adhered to the exit-side guide roller. If magnetic particles cannot be removed in spite of repeated cleaning, the guide roller must be replaced.
   2) Confirm if the tape is held too tightly by the exit-side guide roller, or if the last half of the envelope waveform is flat. If the type is found held too tightly, readjustment should be made by referring to 6-4-4.
   3) Recheck if the damage is still caused on the E-240 tape.
      If similar damage is still found on the tape, the exit-side guide roller should be loosened about 20° counterclockwise.
   4) Check once again that no fluctuation is caused in the envelope waveform or the audio waveform by loosening the exit-side guide roller. To do this, record and play back the E-240 cassette tape.

(5) Perform recording for 60 seconds in the SP mode at the near end of the E-240 cassette tape. Play back the recorded portion and repeat the F. SEARCH ↔ R. SEARCH ten times, following which a check should be made to see if damage is still done to the tape edge. If a damage in the form of a sawtooth or a streak is still occurred on the tape edge by the upper lounge of entrance side guide roller, proceed with the step given below.
   1) Check if a large amount of magnetic particles is adhered to the entrance-side guide roller. If the magnetic particles cannot be removed in spite of repeated cleaning, the guide roller must be replaced with new one.
   2) Confirm if the tape is held too tightly by the entrance-side guide roller, or if the first half of the envelope waveform is flat. If the tape is found held too tightly, readjustment should be made by referring to 6-4-4.
   3) Recheck if the damage is still caused on the E-240 tape.
      If the damage is still found on the tape, the entrance-sideguide roller should be loosened aboud 20° counterclockwise.
   4) Check once again that no fluctuation is caused in the envelop waveform or the audio waveform by looseving the entrance-side guide roller. To do this, record and play back the E-240 cassette tape.

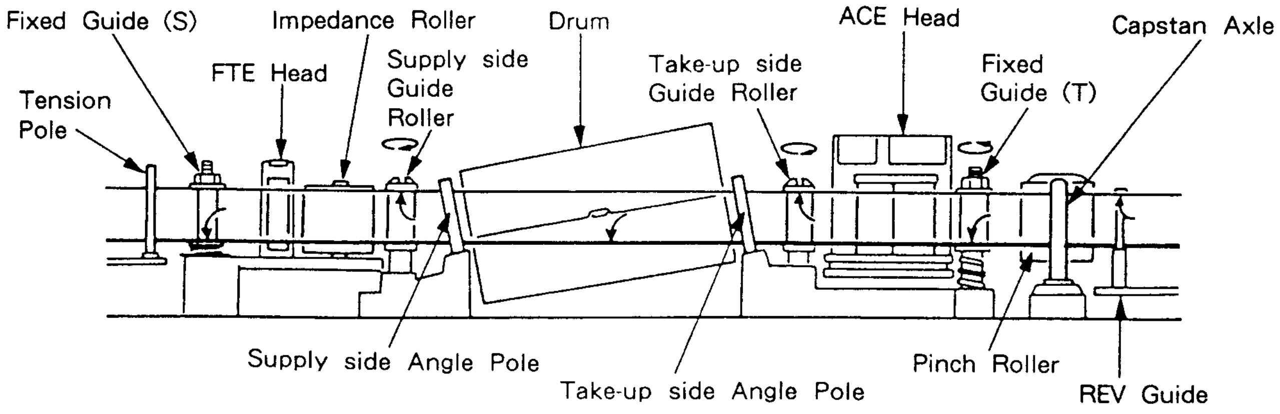


Fig. 6-4-11.